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George Hamin, Director of eBusiness & Information Systems, Subaru.

FEATURING

Trevor Perry
Featured Speaker

Trevor Perry has been a consultant in the midrange industry for over 20 years and is an expert on IT strategy and modernization. He has been recognized by iSeries400 Experts as one of the Top 10 industry influencers, and is actively engaged in the IBM i community. Trevor is a popular speaker at industry conferences and user groups on many technical and keynote subjects, and forges new trails with his motivational sessions.

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The BIG REVEAL

New technology to power your planet

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Squeezing Costs

5 problems solved by server consolidation

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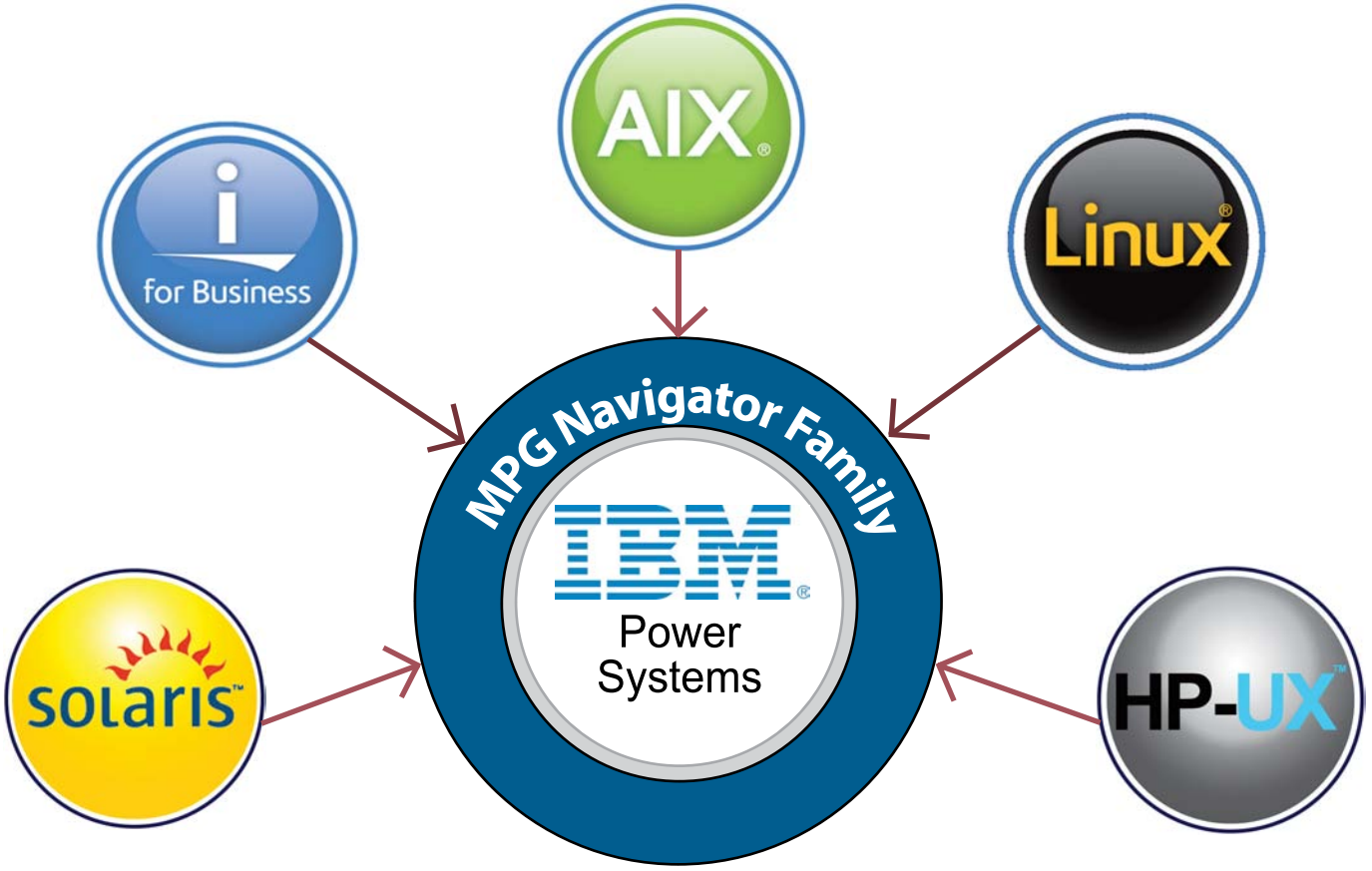

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> **“Power Systems servers provide virtualization without limits.”**
>
> —Jeff Howard, director of marketing, IBM Power Systems

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Power Systems edition

IBMSystems magazine

We asked our contributors: **What one day would you relive if you could?**

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The day I ordered my last laptop when I made the really bad decision to go with Vista vs. XP.

Jaqui Lynch
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My first date with Michele, my muse and my everlasting love.

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The day I met the woman who has been so supportive of me, lo, these many years.

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The day my son was born—pain and all.

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I would have to go back to 1984's, Burnsville, Minn., Fire Muster community event.

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My wedding day—it was magical to marry the man of my dreams overlooking the sunset on Maui.

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Aug. 8, 2009, when my wife and I spent the day in Chicago and the night at the Jimmy Buffett concert. Fins Up!

Greg Hintermeister
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The day I got my first patent and became an "official" inventor!

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Inside this month's issue

PHOTO BY CRAIG BARES

A New Technology Party

My old laptop has been on its last leg for quite some time. The forward slash/question mark key is missing, making me look really stupid when I'm typing "how are you." The screen is cracked and has developed edge creep, so the readable space is shrinking. And it's slower than molasses in January.

To add injury to insult, my wireless router at home decided its usefulness was finished. Hating to be tethered to an Ethernet cord, I hustled to the store for a new one. That's when I discovered that my laptop CD drive no longer reads CDs. Last straw. Curtains. Stick a fork in it. I'm done. Time to break down and buy a new computer.

When I walked out of the store with my new MacBook just days later, I felt like the scene in our cover story art on page 31. In my head, the confetti was flying and observers were clapping wildly. I was beaming. That investment changed everything. I was happier, more productive and smarter—properly punctuating questions in e-mails and chats!

That's how IBM is feeling about the huge announcement of POWER7* technology and four new Power Systems* servers based on it. Excitement crackles in the air as the investment the company's made in the new technology comes to life and makes customers more productive, faster and more efficient. Catch the excitement yourself by reading the cover story on page 30.

When it comes to lowering your total cost of ownership and increasing your ROI, one sure-fire way is server consolidation (and why not do it on POWER7 technology?). See the feature on page 38 to learn why this kind of project is so easy to justify.

If you're considering a storage-area network, don't miss the case study on page 24. If you're interested in benchmarking, see the IBM Perspective column on page 54. And if you think it would be cool to take the heat generated in your data center and use it somehow, see what IBM Research is doing on page 46.

You'll find much more in this issue. I hope the message you need right now is in its pages.

Tami Deedrick

Tami Deedrick, Managing Editor

Contact Tami at tdeedrick@msptechmedia.com

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Bruno Michel

Tap-dancing researcher

IBM Research's Bruno Michel, featured in the Q&A on page 46, is a trained tap dancer and now teacher. He took second in the Swiss Tap Championship in 1978, has performed in several musical productions at the Zurich Opera House and has taught tap to more than 1,000 students.

Elizabeth Stahl

Walkaholic

Elisabeth Stahl, author of the IBM Perspective on page 54, is an avid hiker who has climbed everything from Mount Washington in the White Mountains to Grinnell Glacier in Montana. Her 2010 summer "vacation" plans include a 190-mile walk across England, from the Irish Sea to the North Sea.

Nick Rotondo

Visual historian

This month's cover artist, Nick Rotondo, likes to create architectural visualizations that bring history to life. Thousands of students around the world view his illustration of the 1911 Triangle Shirtwaist Factory fire to learn the details and logistics of this significant American industrial tragedy.

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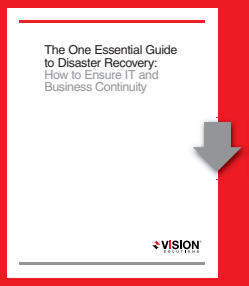

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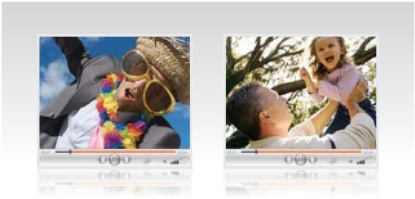

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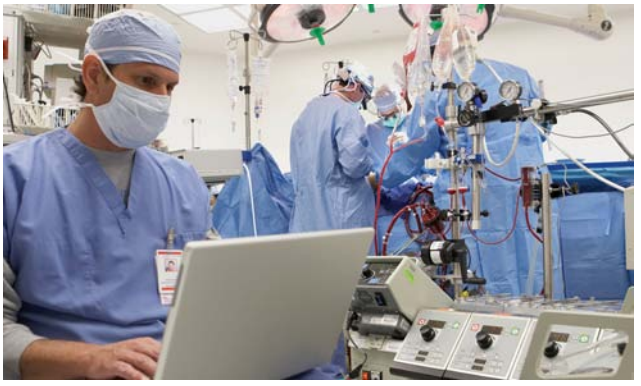

Smarter Healthcare

In November, IBM launched a Health Analytics Solution Center, part of a network of global centers addressing the growing demand for advanced analytics needed to help hospitals and medical staff improve decision-making and provide higher quality care.

The center, hosted in the IBM Global Solution Center in Dallas, will employ more than 100 health-analytics experts, technical architects and specialists who'll take advantage of increased computing power to collect and analyze data streaming in from sensors, patient-monitoring systems, medical instruments and handheld devices as well as the volumes of data generated by hospitals every hour.

IBM hopes to help create a smarter, more connected healthcare system that delivers better care with fewer mistakes, predicts and prevents disease, and empowers people to make better choices. This includes integrating data so doctors, patients and insurers can share information seamlessly and efficiently.

"Tapping into mountains of data within hospitals and clinics can provide powerful new insight into what's working and what isn't," says Dwight Carter, CIO of the Dallas Fort Worth Hospital Council.

IBM has opened five other analytics solution centers in Berlin, Beijing, Tokyo, New York and London, with one more planned for Washington, D.C. As part of this initiative, IBM expects to retrain or hire as many as 4,000 new analytics consultants and professionals globally.

Source: IBM

SOME WORK AND SOME PLAY

Can't get enough work from 8 a.m. to 5 p.m.? Now you can "play" work with an IBM Business Process Management (BPM) simulator: INNOV8 2.0. This online game can help IT workers and business players gain a better understanding of how BPM impacts profitability, customer satisfaction and environmental goals.

See the game: http://bit.ly/INNOV8

Source: IBM

The Cat's Meow

Scientists at IBM Research in Almaden, Calif., have built an artificial brain called Blue Matter. It consists of 1.6 billion neurons and 10 trillion learning synapses, similar in scale to a feline brain. Researchers say these advances provide a unique workbench for exploring the brain's computational dynamics.

"Learning from the brain is an attractive way to overcome power and density challenges faced in computing today," says Josephine Cheng, IBM Fellow and lab director of IBM Research–Almaden. "As the digital and physical worlds continue to merge and computing becomes more embedded in the fabric of our daily lives, it's imperative that we create a more intelligent computing system that can help us make sense of the vast amount of information that's increasingly available to us."

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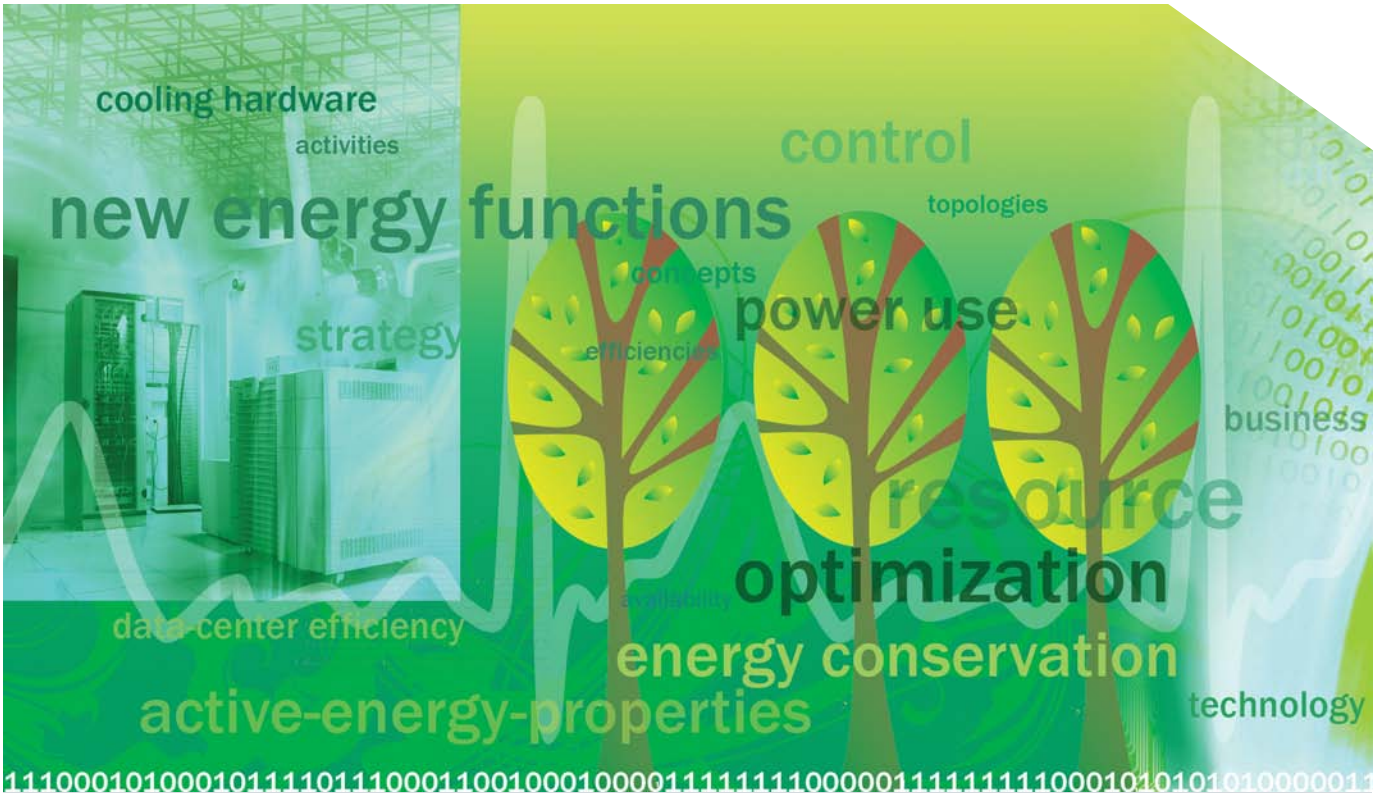


ILLUSTRATION BY KEN EDMONDSON

Greening Data Centers Just Got Easier

Active Energy Manager 4.2 integrates IT and infrastructure

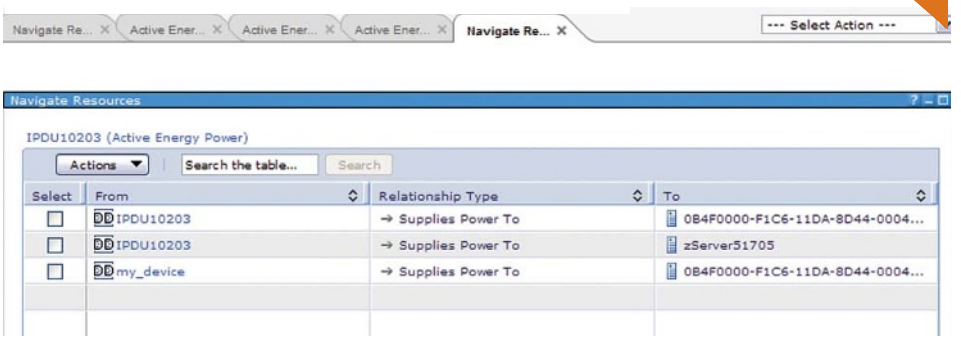
By Jeff Van Heuklon

As the green revolution continues to grow, demand increases for new capabilities in IT-management products that help data centers become more efficient. As I stated in my article "Turning Green Just Got Easier" (www.ibmsystemsmag.com/aix/februarymarch09/trends/24265p1.aspx), IBM Systems Director Active Energy Manager* (AEM) users are saving significantly on energy costs. A new release of the product, version 4.2, meets the need for new capabilities. This includes running on the new IBM Systems Director 6.1.2.

This version expands what equipment AEM can monitor, exploits the data coming from this new equipment to improve data-center efficiency and reliability, and makes it even easier to use. AEM 4.2 pulls together all of the energy-related information you need to understand how the power and

Figure 1

Show Relationships



cooling infrastructure affects servers, storage and networking equipment in a data center. With ease-of-use enhancements, you can quickly find what you're looking for. New alerts help you pinpoint servers at risk when the data-center infrastructure encounters problems. AEM can now be an effective link to your operations team.

Equipment Support Expands

As new IBM servers and firmware levels have shipped over the past year, AEM has been updated periodically via update and patch releases to add whatever's needed to monitor and manage the energy. Also, as new energy functions have been added to this equipment, AEM surfaces these new capabilities. Several new System x* models have been added, and the newest firmware release for IBM POWER6* processor-based servers is now supported. This firmware level can report such new information as the power the system consumes when idle and the typical time required to IPL the system. This can help you decide whether to power off a system at certain times to save energy. All new models and firmware levels are documented in the Information Center for AEM, listed in "Learn More" (page 17).

Since not all IT equipment in a data center can be directly monitored for energy use, AEM supports a wide range of power distribution units (PDUs), meters and sensors to indirectly monitor these energy consumers. In previous releases of AEM, support was added for IBM DPI PDU+ units, PDUs and uninterruptable power supplies (UPSs) from Eaton Corporation, PDUs from Raritan Corporation, sensors from Synapsense, meters and sensors from SmartWorks, and sensors from Sensatronics and iButton. In AEM 4.2, support has been added for PDUs from APC, Avocent and Rittal, and sensors from Arch Rock.

Any server, storage device or networking equipment IBM Systems Director manages can be associated with any of these devices. If you have an IBM DS3000 storage controller plugged into an APC PDU, AEM can show how much power the DS3000 consumes by pulling the information from individual outlets on the PDU. If you're worried the inlet temperature for an IBM POWER5* processor-based server might get too high, you can place an Arch Rock thermal sensor in front of the system and AEM can alert you when the temperature reaches a threshold. Even if IBM Systems Director doesn't currently manage the equipment that a PDU or sensor is associated with, you can create a representation of that equipment in IBM Systems Director to do an association. Figure 1 (left) shows one way AEM can display these relationships.

In addition to directly supporting the power equipment and sensors listed, AEM can monitor an even wider set of infrastructure equipment through integration with companies that specialize in managing power and cooling hardware. Over the past year, AEM has integrated with these infrastructure-management applications: SiteScan Web from Emerson Network Power, Power Xpert and Foreseer from Eaton Corporation, and InfraStruXure Central from APC.

Through AEM interfaces with these products, it can monitor power and temperature from equipment they manage, including PDUs, UPSs, air conditioners, chillers and power meters. Since these applications also support most of the equipment these companies make (as well as a wide range of products from other manufacturers) this greatly increases the scope of what AEM covers. In AEM 4.2, more sensors and meters are available through this integration. All of these products can also be associated with servers, storage and networking equipment.

More Power Control

AEM PDU support has expanded to cover not only outlet monitoring on PDUs, but also outlet control. AEM interfaces

Figure 2

Control PDU Outlets

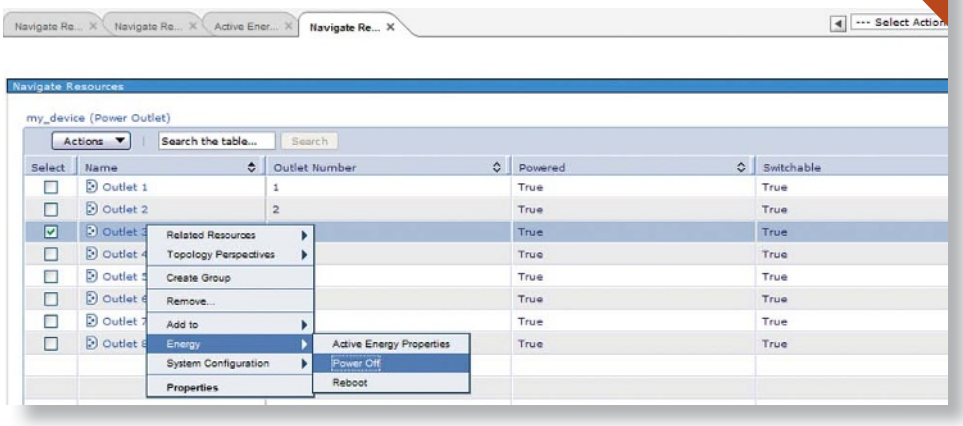
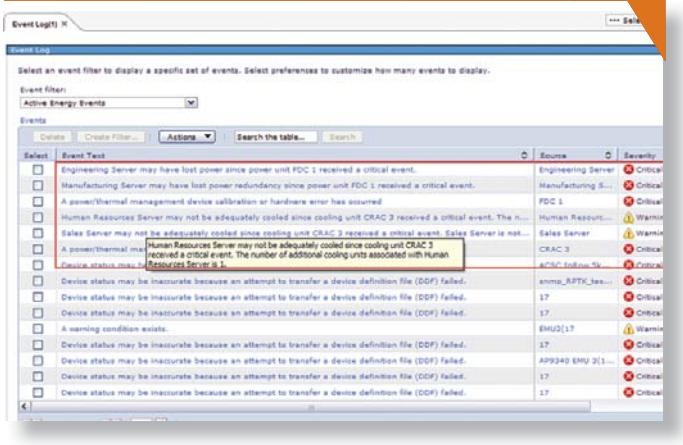


Figure 3

Alerts on Servers



now allow individual outlets to be powered on and off. From one console, you could control all of the outlets in your data center. This is useful for several purposes. To prevent someone from plugging additional equipment into a rack with limited power capacity, you can disable unused outlets. This lets you effectively cap the power the rack uses. In emergencies (such as a brownout) where power capacity shrinks, you can force equipment off by powering down its outlets. Or if a server is nonresponsive, you can now power its outlets off and on to bring it back up. Figure 2 (page 15) shows how a user can do this by right-clicking on a PDU outlet. This feature is available for the APC Switched Rack PDU, Eaton PowerWare Switched PDU and Raritan Dominion PX PDU.

Exploiting Infrastructure Support

Now that any IT device can be associated with any power and cooling infrastructure and sensors AEM supports, it's possible to build power and cooling topologies. You can create a relationship between a server and the PDUs it's plugged into, relationships from each of those PDUs to the branch circuits that supply their power, and relationships from those branch circuits to the UPSs they're connected to. This creates a power topology that can be graphically viewed within AEM and exploited for improved availability. For example, if any of the PDUs, branch circuits or UPSs in a server's power topology report a problem, you'll get a warning logged against that server stating a potential loss of power redundancy. Figure 3 (above) shows some examples of these alerts.

A similar capability is available for cooling equipment. You can create an association between an air conditioner and a server it cools. In fact, the server can be associated with multiple air conditioners. This lets a cooling topology be viewed graphically and, as with the power example, a server warning can indicate this server is at higher risk of overheating. Some type of computational fluid dynamics analysis is recommended in advance to help determine the relationships.

For both power and cooling topologies, you can set up automations that let you take action immediately for any of these warnings, or simply to send an e-mail notification.

Ease-of-Use Enhancements

Several changes in AEM 4.2 can help you more easily optimize your data center's energy consumption. For example, it's now easier to find the resource you're trying to monitor or manage. Instead of all power-monitored equipment showing up in a straight list, it appears hierarchically: In the resource navigator, BladeCenter* servers appear indented from a BladeCenter chassis, outlets are indented from a PDU and so on. Additionally, the AEM summary page has been enhanced so its mini navigator shows four main categories instead of trying to show all resources in a small view. The categories are: Active Energy Manager Resources, Candidate Energy-Managed Resources, Energy-Managed Resources by Type and Externally Metered Energy-Managed Devices. From these categories, you can quickly drill down to the resources you're interested in. Performance within the resource navigator has also been improved.

Additionally, the resource-navigator view now shows relationships between sensors plugged directly into PDUs. Before, it took several steps to get to this information. The new power and cooling topology views I've described will also be great for easily understanding other relationships.

One further enhancement is the improved active-energy-properties page. This page now includes a highlights box of the most important metrics, as well as a tasks box to make it easy to take actions to affect the energy or get a different view of the data (see Figure 4, below).

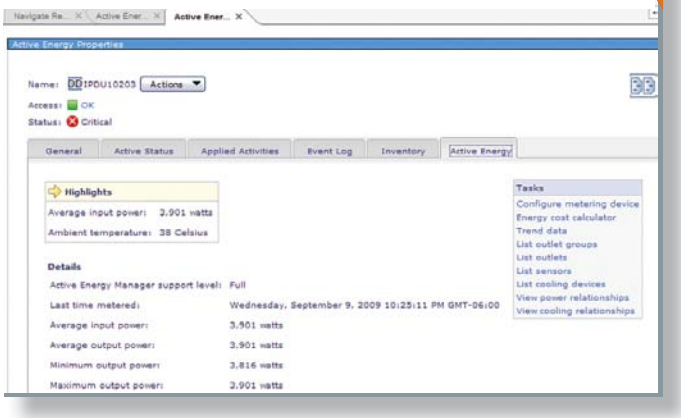
Other Applications Exploit AEM

As with previous versions of AEM, the ITM for Energy Management product from Tivoli* can collect energy data from AEM and use it within that application. ITM version 6.2.1.01 for Energy Management will run with AEM 4.2.

Additionally, a new set of external, programmable interfaces is available with AEM 4.2. These are representational state transfer-based Web services. Through these interfaces, an application can do just about anything that can be done within the AEM user interface. Any customer who deploys AEM can use these interfaces for internal company applications.

Figure 4

New Properties Page



Learn More

IBM Systems Director Active Energy Manager
www.ibm.com/systems/management/director/about/director52/extensions/actengmrg.html

Information Center for IBM Systems Director Active Energy Manager
http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp

Tivoli Monitoring for Energy Management
www.ibm.com/software/tivoli/products/monitor-energy-management/

Optimize Your Data Center

AEM is a strategic product that will continue to make data centers more efficient. The capability to monitor and exploit the data coming from new types of equipment can greatly improve data-center efficiency and reliability, and make it even easier to use. AEM 4.2 pulls together the information you need to understand how power and cooling infrastructure affect the servers, storage and networking equipment in a data center. Additionally, with the ease-of-use enhancements, you can now quickly find what you're looking for. More information is available on the IBM Systems Director AEM Web site.

Jeff Van Heuklon is responsible for strategy and architecture for the IBM Systems Director Active Energy Manager product. He is a senior technical staff member at IBM with 27 years of experience in firmware and software design.

Send feedback to Managing Editor Tami Deedrick at tdeedrick@msptechmedia.com.

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ILLUSTRATION BY KEN EDMONDSON

Data is Money

A recent survey explores the state of Power Systems resilience

By Wm. Edward Vesely

The idea that data is a key business asset is hardly disputable; even so, how to affix a direct financial value to it remains a matter of debate. Maintaining data availability is essential to overall business continuity, despite difficult economic environments. In light of this, a yearlong study on what companies are doing to keep data resilient and minimize downtime provides some insights.

The study, conducted by Vision Solutions, surveyed the state of resilience on Power Systems* solutions. This year's results, collected between September 2008 and October 2009, include data from nearly 4,000 technical professionals and executives managing IBM i and AIX* environments in more than 100 countries. The survey's scope and depth included which technologies and methods

are being applied and how fully and effectively they're implemented. To ensure validity, the results in the report include only those questions where several hundred responses were available for analysis.

Resilience Under Pressure

Business leaders understand intuitively the value of their data and know they must daily address the practical, tangible issues of protecting it from loss or corruption and putting it to work effectively, efficiently and profitably.

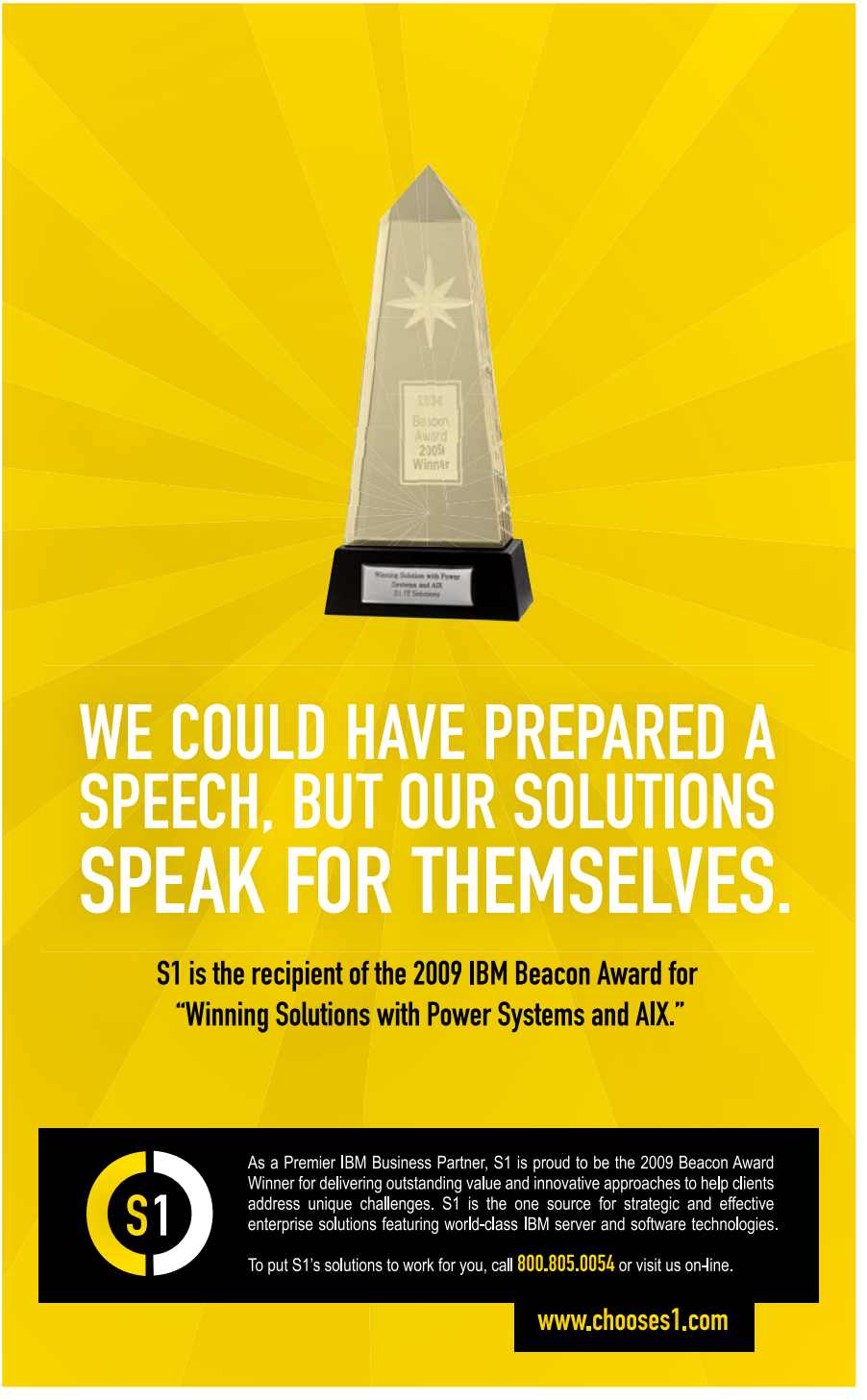
But just how that intuitive understanding translates into pragmatic, front-line actions—in the data center and throughout the business—varies by company, in methods and in levels of commitment and success. Protecting the availability and even the existence of these business-sustaining digital assets is only one of many mission-critical objectives executives must address. The final measure of business leadership is the capability to identify and execute the right priorities with the optimum balance of resource allocation. Executives should consider these central issues:

- A trend toward increasingly aggressive recovery time objectives (RTOs) and recovery point objectives (RPOs) is apparent across the platform. But evidence suggests that many firms lack the appropriate technologies to achieve these goals.
- Data protection and high availability are related but still distinct objectives. Findings support increasing adoption of solutions to address both areas, but keeping data and applications continuously available hasn't been addressed as fully or consistently as protecting against catastrophic data loss.
- Traditionally, disaster-recovery (DR) capabilities have been viewed as insurance against major natural or human-caused disasters. But increasingly, businesses are realizing the harm of frequent mini disasters—power or network outages, maintenance and upgrade work, and even the corruption or loss of individual files. Technologies for recovering from and actively avoiding these events are maturing and gaining support.

Few dispute the old saying "time is money." The maxim "data is money," though not as deeply ingrained in common business practice, is gaining ground with business leaders in companies of all sizes and across all industries.

Consider some basic steps for your data-protection strategy:

- Evaluate the costs associated with downtime of any duration from any cause.
- Set measurable goals for systems and data recovery speed and completeness (RTOs and RPOs) based on business needs, not current technological or procedural capabilities. Then, identify and work toward implementing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67 percent of respondents are unwilling to lose more than **one hour** of transactions or operational data.

technologies and processes that support your objectives.

Where appropriate technologies are in place, ensure that the company's ability to recover from downtime or data loss really meets stated recovery and availability objectives. Live testing of systems and procedures is vital, both to train personnel and to measure capabilities against present and future needs. Historically, companies have adopted IBM Power Systems solutions (and all of their predecessors) because of the reliability, flexibility and sheer power they provide. In reviewing how these same demanding, forward-thinking companies deal with data, application and business resilience, keep in mind the backdrop of the past year's business environment. It's truly an informative story of resilience under pressure.

The State of Resilience

As financial constraints limit resources, rather than retreat to accepting less-challenging RTOs and RPOs, it appears the AIX and IBM i user base realized the need for more aggressive levels of resiliency. Protecting data and applications has proven to be a mandate that can't be ignored or short-changed simply because money is tight. Yet at the same time, most IT managers worry that their DR plans may not execute properly or completely when invoked. They cite a lack of recent or complete testing as their main concern.

Though the overall profile of data-protection technology options hasn't changed radically in the past year, notable trends exist. Tape is still the firewall, the backstop for data loss in the event of catastrophe. It shows little sign of yielding to spinning disk anytime soon. Examining the adoption of the entire range of data-protection options reveals a measurable trend toward granularity and immediacy. IBM i and AIX users increasingly seek real-time protection of data as it's created and changed, as well as the capability to recover from any level of data loss or corruption. While the adoption of full high availability is increasing, the real interest and energy are directed toward improved data recoverability. As continuous data protection (CDP) technologies mature, both in capability and ease of use, they're being quickly adopted among small, medium and large businesses alike. CDP technologies enable the most aggressive RPOs.

Compared with last year's study, businesses show a strong move toward zero data loss while the remaining responses are more evenly spread

Definition

(ri kuv' ər ē point əb jek' tiv)

recovery point objective

n. the age of the data you want the capability to restore in the event of a disaster. If your *recovery point objective* (RPO) is six hours, you want to be able to restore systems back to the state they were in no longer than six hours ago. To achieve this, you need make backups or other data copies at least every six hours. Any data created or modified inside your RPO will be lost or must be recreated during a recovery. If your RPO is zero, synchronous remote copy solutions are your only choice.

across the spectrum. While 45 percent of respondents indicated they could accept business downtime of six hours or more after a server or application failure, 67 percent are unwilling to lose more than one hour of transactions or operational data.

Key Findings

Overall, AIX and IBM i shops, both pure and mixed, reported more aggressive RTOs, with distinct 10-percent growth over the past few years in the number of those targeting six hours or less. Data also seems to confirm that the larger a business becomes, the more expensive downtime of any type becomes; thus more businesses are establishing increasingly shorter RTOs.

Although they have DR plans in place, the vast majority of IT managers and professionals globally are concerned that, when pressed, plans may not execute properly or at all. They understand that DR plans must be tested regularly to ensure systems and staff are ready should the recovery plan need to be invoked. But they concede that testing is currently insufficient in frequency or completeness to assure success.

Definition

(ri kuv' ər ē tīm ŏb jek' tiv)

recovery time objective

n. the duration needed to recover from a disaster, or how long you can afford to be without your systems

Relying upon tape backup as the primary data protection and recovery technology is rapidly becoming more than a case of less-than-optimal business practice. The cost to any business of permanent data loss, along with the cost of unplanned downtime while waiting for data recovery, is avoidable through investment in technologies that go beyond tape. Given the availability of such a wide range of advanced data-protection technologies, the investment in CDP or other real-time replication options could provide significant, near-term ROI.

Overall, the state of resilience is improving among IBM i and AIX customers. Under financial pressure, businesses see most notable gains with technologies and projects well suited to cost containment. What remains to be seen is if this trend will continue or whether the path to higher resilience will change with the economy in the coming year. P

Wm. Edward Vesely is the senior vice president of marketing and business development at Vision Solutions.

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Making Change

Bunzl Distribution USA assembles success with Power Systems and SAN

By Jim Utsler

"One of the things I like most about my job is the challenge," says Bunzl Distribution USA Technical Support Manager Cindy Baur. "No two days are the same, and I'm always learning something."

That's fortunate, because something—from the mundane to the mission-critical—always comes up. For example, after the company outgrew its IBM System i* servers, it decided to move to two new IBM Power Systems* 570s and an IBM storage-area network (SAN) solution.

New servers and more power sound great, but in Bunzl's case, that upgrade—not only to Power 570s and two IBM System Storage* DS8100s, but also to IBM i 6.1—presented a host of unexpected challenges, including, most significantly, performance issues.

Hardly a wallflower, Baur decided to take charge of the situation, using Midrange Performance Group's (MPG's) Performance Navigator to monitor her systems and identify the bottlenecks. Using that vital data, she then worked with IBM to resolve her performance problems.

"It took them a while to believe what I was telling them, but they finally came around and began issuing PTFs to help out not only me, but also others who were experiencing similar problems," she says. "Without a performance-monitoring tool such as Performance Navigator, I might not have known what the root

PHOTOS BY DAN DONOVAN

Bunzl Distribution's Cindy Baur says IBM storage experts and weekly massages helped her through a complicated upgrade.

Up Close

CUSTOMER: Bunzl Distribution USA
HEADQUARTERS: St. Louis
BUSINESS: Distributor of food packaging, disposable supplies and cleaning products for the food processing and retail markets
CHALLENGE: Keeping up with growing demand for increased processing and storage
SOLUTION: Upgrading its servers and operating system and moving to a SAN-based storage environment
HARDWARE: Two IBM Power Systems 570s and two IBM System Storage DS8100s
SOFTWARE: Midrange Performance Group's Performance Navigator and a heavily modified ERP solution

causes were. Now, we have more than enough performance to accommodate both current and future growth."

Peter and Paul

Based in St. Louis, Bunzl offers more than 250,000 products—food packaging, disposable supplies such as gloves, and cleaning and safety products—to food processors and retailers, including supermarkets. "We distribute things like the plastic containers prepared foods come in, sanitary tissues used in bakeries and plastic bags lunch meats are put into. Supermarkets are our primary market," Baur says.

Notably, Bunzl has a stake in all 50 U.S. states and Puerto Rico, Canada, the Caribbean and parts of Mexico. Some 3,500 employees work at its headquarters or in its approximately 90 warehouses. The company, one of the leading nonfood consumable-products suppliers in North America, is part of an international company, London-based Bunzl PLC, with total worldwide sales exceeding $6 billion (4.16 billion euros).

As is typical with distribution companies, orders come into the company (mainly via EDI, Baur says), are processed at the warehouse, shipped to customers and invoiced upon transaction completion. On the other end of the business, Bunzl places orders with manufacturers based on customer needs, receives and processes those orders at the warehouses and pays for those goods via accounts payable. For both accounts payable and accounts receivable, Bunzl uses a heavily modified ERP application that runs on IBM i. "The vendor got out of the distribution business, so we bought the code and have been updating it ever since," Baur says.

Conversion

Bunzl PLC's total worldwide sales:

$6 billion = 4.16 billion euros

Bunzl uses the two new Power Systems servers for day-to-day business. One 570 resides at its headquarters in St. Louis and the second, a Capacity Backup (CBU) 570, is offsite in Chicago. The production 570 runs six LPARs and the CBU 570, acting as a failover box for the production system, has another four. Both data centers have a DS8100 storage device, with the production SAN device mirroring to the other for data backups.

Before this configuration, the company used an IBM System i 570 for production and a System i 520 for failovers. But as with many businesses, especially those acquiring other companies and deploying new technologies, these older systems began to show their age. "We were struggling," Baur says, "because we were having to move processors around depending on workloads. We were robbing Peter to pay Paul."

Fortunately, Baur was well aware of the situation, thanks to her use of the MPG Performance Navigator. In fact, she uses the product daily to proactively monitor system performance. That's how she knew "many, many months ahead of time," as she puts it, that things were beginning to spiral out of control.

"As we continued to grow, so did our memory requirements, our disk requirements, our processor requirements and our storage requirements. That's how we got to the situation we were in. So it was time to rethink nearly everything, even from a performance perspective, because we have a lot of batch subsystems that require a great deal of processing power," Baur says.

Obviously needing to address these and other issues, Bunzl decided to upgrade its existing servers to the Power Systems servers and, wanting to move away from internal storage, a DS8100-based SAN. For assistance, the company turned to Tamalpais Group, which helped acquire and install the new environment.

Bunzl initially hesitated to go with a SAN, not having any prior experience with that type of storage infrastructure. But its fears were alleviated after it attended an IBM executive storage briefing in Tucson, Ariz., about SANs. "The IBM storage experts gave me some warm fuzzies," Baur says. "They were very knowledgeable about what we wanted to do, how to do it and, in the end, helped—along with the Tamalpais Group—deploy the DS8100s."

"[IBM storage experts] were very knowledgeable about what we wanted to do, how to do it and, in the end, helped deploy the DS8100s."

—Cindy Baur, technical support manager, Bunzl Distribution USA

Sweating Bullets

But a SAN posed its own set of challenges, even beyond the initial learning curve. For example, the move from internal to external storage required Bunzl to migrate to IBM i 6.1. This shouldn't have been a big deal, but it turned out to be. For one thing, some of Bunzl's 35-plus third-party applications weren't yet 6.1 compliant. "If we had been a typical distribution shop with maybe a handful of third-party apps, it would have been a piece of cake. But our biggest issue was having so many of them, and we had to contact all of the vendors to make sure their software would work under 6.1. So, some of the packages required fixes or upgrades to become compliant, and some of the vendors drug their feet throughout the year previous to us going live. To make matters even worse, some of them didn't even want to become 6.1 compliant, so we had to go look for replacement packages," Baur says.

Because of these and other issues, Bunzl chose to deploy 6.1 and its supporting applications on testing and development

For more on SANs, see "Fruitful Storage" (http://www.ibmsystemsmag.com/ibmi/july09/coverstory/25603p1.aspx?)

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LPARs on the backup System i 520 to make sure they would work after the operating-system upgrade. The company began this process in February 2008 and continued through the official launch of 6.1 in March 2008 and the hardware order date in December 2008. Production-LPAR upgrades weren't completed until Feb. 14, 2009, a mere week before the new Power Systems servers were installed and the migration process began. "We were sweating bullets all the way through," Baur says.

But that wasn't the end of it. Although most of its third-party applications had by then proven 6.1 compliant and were functioning in the company's production environment within the new servers, Baur began noticing system lags that shouldn't have existed, especially after the performance boosts the company had hoped to gain by moving to a Power Systems environment. Curious to see what was going on, she used Performance Navigator to drill down through processes, immediately noting that system utilization had skyrocketed from 5 percent to 25 percent.

Details, including specific jobs, in hand, Baur called IBM for help. In response, IBM issued a PTF that brought that utilization back into the normal range. However, Baur also noticed that QTFTP jobs were consuming many more system resources than needed, sometimes up to 8 percent of CPU for each job. Again using Performance Navigator, she discovered that those jobs had jumped from between 400 and 500 a month to more than 700,000.

"Once I got (IBM support's) ear, they began working on a solution for me. Oddly, I was the first customer to have contacted them with this problem. Not long after, though, another got in touch with them for the very same issue, so it was becoming apparent to them that this wasn't an isolated issue."

After applying several more PTFs, Baur's expected performance-utilization rates, as well as the number of QTFTP jobs, fell back into line, with system utilization dropping back to 5 percent and the monthly QTFTP job numbers falling back to 400 to 500.

Strong Support

As with any major hardware upgrade, operating systems and/or applications, issues are sure to crop up. But Bunzl could get through them with the strong support from Performance Navigator, Tamalpais Group and IBM.

"My weekly massages didn't hurt either," Baur jokes. "In fact, that might be one of the most important factors that got me through this—that and the birth of my first grandchild. That was actually the highlight of my life during this time. Now,I can sit back and relax a little."

Jim Utsler, *IBM Systems Magazine* senior writer, has been covering technology for more than a decade.

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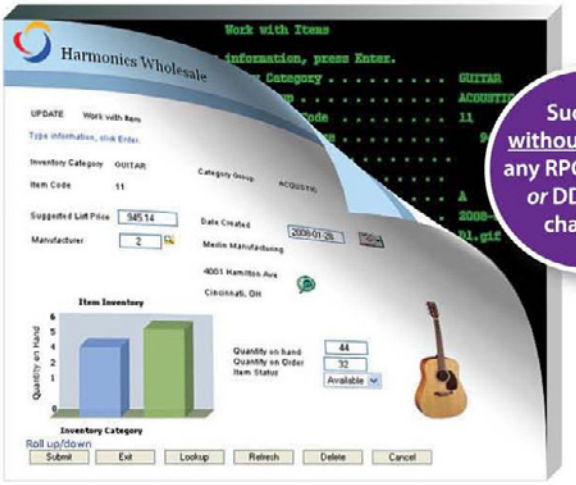

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POWER7 Unveiled

Power your planet with the latest technology and four new servers

By Tami Deedrick

This month, IBM reveals POWER7* technology and the newest servers based on it. The company has been on a reliable, predictable cycle with POWER* releases, delivering the next generation about every three years. The POWER7 reveal was expected in 2010, but the early-first-quarter announcement may have surprised many.

"We've been on this Power* journey now for 20 years," says Jeff Howard, director of marketing, IBM Power Systems*. "And we've been delivering Power generations on a clear cycle that our customers have come to expect and appreciate from us. The POWER7 announcement follows that cycle, but in fact, we're delivering it early so we can provide our Power customers with the type of continued price/performance gains—both in terms of core performance and also the capacity gains they need—to drive their most critical workloads, such as those in smarter energy, healthcare, retailing and financial services implementations."

TAKEAWAY

- IBM releases the POWER7 processor in the first quarter.
- Four new servers are available: Power 750, Power 755, Power 770 and Power 780.
- New technologies include TurboCore, intelligent threading, Active Memory Expansion and EnergyScale.

ILLUSTRATION BY NICK ROTONDO

Price/performance gains are the cornerstone of the POWER7 release. IBM is focused on workload optimization that helps customers do more—faster and at a lower cost. All four of the newly announced servers—the Power 750, Power 755, Power 770 and Power 780—take workload optimization to a new level.

Changing the Playing Field

"IBM is changing the playing field in the UNIX* market with incredible new price/performance and functionality that really changes what the notion of what UNIX performance means," Howard says. "And while we obviously are continuing to deliver not only more cores but also—unlike our competitors—more performance per core, we're doing that with a set of capabilities that are unmatched by anyone in the UNIX market, or the x86 server market for that matter."

One notable change is that new Power Systems servers built on the POWER7 technology can support up to 1,000 virtual machines with PowerVM*. Along with this increased virtualization scalability, Power Systems servers can deliver levels of energy efficiency unmatched in the industry. EnergyScale* technologies dramatically reduce energy cost and management with automated energy optimization.

"Power Systems servers provide virtualization without limits," Howard says. That means IBM PowerVM—compared with VMware—can provide up to 32 times the machine size, up to eight times the memory per virtual machine, and a level of flexibility that lets you dynamically add resources to a virtual machine or remove them to flow them to other virtual machines.

"You can have the confidence to drive your systems—as many of our clients do—to utilization levels over 90 percent," Howard says. High system utilization boosts ROI, especially compared with x86 systems or other UNIX systems from Sun or HP that typically only run in the 15 to 20 percent utilization range.

"This is how you get significant levels of consolidation of 20, 30, even 40 systems or more of the competitor systems on just one Power System server—which helps customers save costs, save resources, save energy, save software and maintenance cost, and save space in their data centers," he explains.

> "We have full binary compatibility with AIX and IBM i moving into POWER7. It's a nondisruptive move."
>
> —Jeff Howard, director of marketing, IBM Power Systems

The 700 Family

IBM complements the POWER7 announcement with four new Power Systems servers. For quick overviews of the systems, keep reading. For the feeds and speeds, see "Meet the 700s" (www.ibmsystemsmag.com/ibmi/webexclusive/31314p1.aspx).

Power 750 Express IBM expects the Power 750 Express to boast world-record performance and be No. 1 in four-socket performance for major workloads. This multicore POWER7 system offers up to 32 cores and 320 partitions—much larger than the Power 550. It replaces the 550 and the Power 560. New intelligent threading technology optimizes thread use to give you either the highest per-thread performance or maximum throughput, depending on workload requirements. The Power 750 also offers Active Memory Expansion*, which lets you expand physical memory up to 100 percent, to drive significantly more throughput for applications like SAP. The Power 750 is ENERGY STAR certified and helps reduce energy cost with EnergyScale technology. It also has a call-home capability and Light Path diagnostics.

Power 755 The Power 755 is a specially packaged POWER7 server optimized as a high-performance computing (HPC) cluster node. Designed to be used in a multiserver node cluster, the Power 755 is a fixed-configuration package with 32 POWER7 cores with a feature set designed for HPC deployment. The Power 755 is optimized for companies and universities to run the most challenging research and commercial analytic workloads. Because of the leading-edge nature and rapidly growing performance demands of these workloads, Power 755 users are expected to be among the earliest adopters of POWER7 technology.

Power 770 The Power 770 can be compared to the Power 570 with its modular, stackable design. On the surface, the Power 770's 3.5 GHz in systems up to 48 cores and 3.1 GHz for systems up to 64 cores seem lower than the 5 GHz on the Power 570. But the 770 offers more cores and more performance per core, extending IBM's performance leadership, according to Howard. In fact, it delivers two to five times the total

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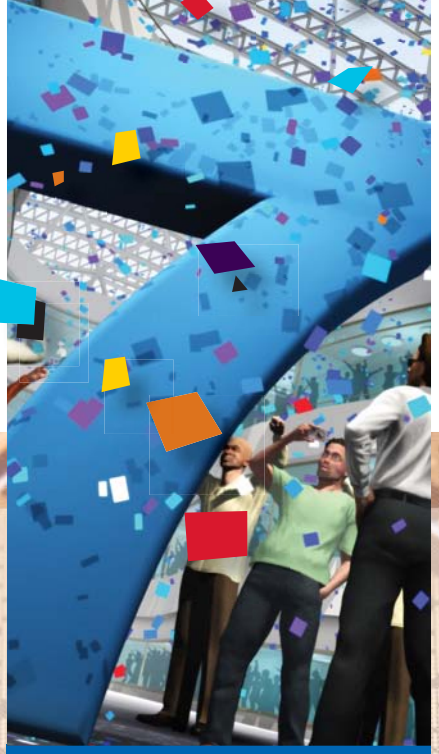
TurboCore, Active Memory Expansion and More



> "You can have four times the capacity with the same energy bill."
>
> —Jeff Howard

Power Systems* servers using POWER7* technology offer balanced system designs that automatically optimize workload performance and capability at either a system or virtual-machine level. The newest features of the POWER7 line include TurboCore*, intelligent threading, Active Memory Expansion* and EnergyScale* technologies.

TurboCore

Switching your POWER7 system into the new TurboCore mode optimizes it for core frequency and cache utilization. It delivers maximum capacity and performance for database and transaction workloads. "Only Power* technology gives you the capability to have the best in transaction processing and the best in throughput computing in one system," says Jeff Howard, director of marketing, IBM Power Systems. POWER7 technology also provides an intelligent caching capability that lets cache flow from core to core depending on where it's needed, again optimizing to the workload.

Intelligent Threading

New intelligent threading technology dynamically switches the processor threading mode to deliver optimal performance—either the highest per-thread performance or the maximum system throughput based on application requirements.

Active Memory Expansion

Active Memory Expansion lets you double the memory capacity of the physical memory in your system for workloads such as SAP. It provides some boost to other workload types as well, such as transaction or Web applications. "You might get anywhere from 20 to 40 percent increase in memory in those workloads, but we've specifically tuned it for SAP to give you up to two times the amount of memory that's physically in your system," Howard says. "And when you combine that with our new solid-state drive capability, it really optimizes the transaction throughput and the I/O operations for hot data and hot pages in the system."

Intelligent Energy

Anticipated regulations on energy use and carbon footprint make reducing and optimizing energy consumption a key IBM goal. EnergyScale technology and dynamic energy optimization offer significant reductions. Better price/performance helps drive reduced use as well. "Because we now have eight cores per socket, we're basically delivering you four times the performance in the same footprint and energy envelope that we delivered with POWER6*," Howard explains. "So, with POWER7, you can have four times the capacity with the same energy bill and the same facility space. Cutting energy by three quarters while having the same performance that you have today is a pretty good deal."

And More

IBM is also announcing Rational* Developer for Power and Rational Team Concert* for Power, combined packages that support IBM i and offer a statement of direction to include support for AIX*. This will extend the current IBM i development and collaborative change management tools environment with support for AIX developers. Also note that the new POWER7 systems support the DB2* pureScale* technology that provides virtually unlimited capacity with continuous availability for AIX applications.

In addition to these new capabilities, POWER6 customers running AIX* or Linux* who also have PowerVM* Enterprise Edition can leverage Live Partition Mobility to move their applications from POWER6 to POWER7 technology without ever taking their applications down.

"All of these taken together provide a level of both transaction and throughput performance in a single system that no one's delivered before," Howard says.

—T. D.

Happy Birthday, RS/6000

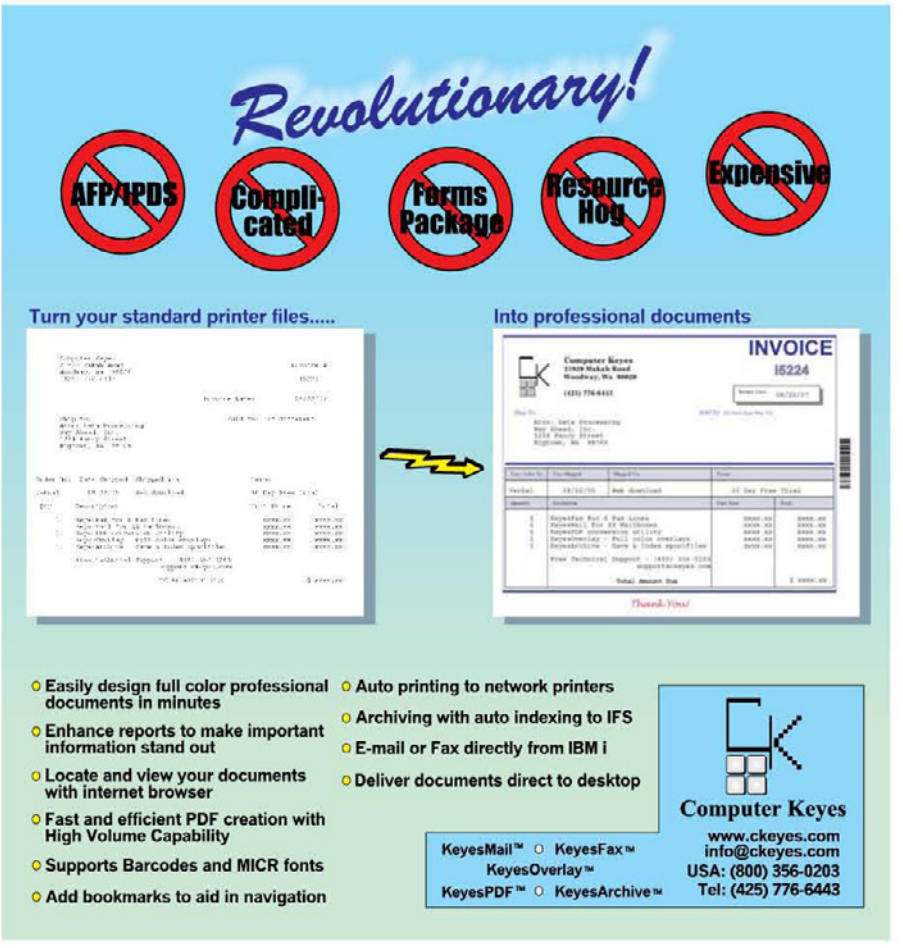
February 2010 marks the 20th anniversary of IBM's RS/6000* servers, the first servers to exploit POWER* processor technology.

systems aggregate throughput and up to 40 percent more performance per core. The Power 770 also offers a three- to four-times improvement in energy efficiency. Live Partition Mobility on this system provides a smooth migration from POWER6* systems to POWER7 systems without taking down any applications. The Power 770 also offers intelligent threading and Active Memory Expansion technologies.

Power 780 The all-new high-end Power 780 is positioned between the 770 and the Power 595, the largest POWER6 technology-based system. It doesn't replace the 595. A major new feature of the 780 is TurboCore* technology, which lets you select to run the system with fewer cores to exploit increased cache from other cores on the chip. The Power 780 offers the highest clock speed of any POWER7 system at 4.1 GHz running in TurboCore mode. TurboCore's key advantage is that it optimizes the system to workloads such as large databases that can exploit the combination of high GHz and expanded cache for the highest per-core performance available in a POWER7 system. The 780 offers intelligent threading and Active Memory Expansion technologies and can take advantage of Live Partition Mobility as well. For more on these new technologies, see "TurboCore, Intelligent Threading and More" (page 34).

All four new systems will support AIX* 5.3 and 6.1, IBM i 6.1 and the existing versions of Linux*. "We have full binary compatibility with AIX and IBM i moving into POWER7," Howard says. "It's a nondisruptive move." That means no recompilation and no program conversion.

"One of the reasons for the IBM i 6.1.1 release last October was to be ready



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at the microcode level for POWER7," Howard says. "So the software that you need to support POWER7 processors is already out there and running, and supported by thousands of ISVs."

More Capabilities, Easier Choices

In addition to the new systems, IBM has added dynamic new energy-optimization capabilities that let you save energy on the server itself using IBM EnergyScale technologies, and save up to 90 percent of the energy across the range of servers that you're consolidating into a POWER7 server. Because IBM knows it's critical that the systems are up and running, the company has also focused on improving resiliency to help companies avoid planned downtime.

"That means not only do we have high availability and the highest reliability in the UNIX market," Howard says, "but we also provide technologies like PowerHA* high-availability software that allows you to maintain systems without disruption, and now, with PowerVM Live Partition Mobility, you can even do an upgrade from POWER6 to POWER7 without taking your applications down. And that means that you can maintain and upgrade systems without interrupting user applications and service."

Across all of this, IBM provides a whole new level of management with IBM Systems Director and VMControl*. Systems Director can perform the core platform management and offers plugin capabilities like VMControl to manage virtualization. IBM now delivers Systems Director in three editions to simplify the offering for customers. The Express, Standard and Enterprise editions will be familiar to IBM customers as the designations are used on other IBM products such as PowerVM. The Express Edition is an entry platform-management offering targeted to smaller companies. It then scales with additional management features to Standard and Enterprise editions. Systems Director Enterprise Edition adds enterprise service management features from IBM Tivoli* as well as the capability to manage groups of virtualized servers called system pools as if they were single entities. This provides a level of automation that significantly improves productivity for systems administrators.

"Standardizing our software into editions helps our customers better know what to buy. It's really about packaging things in a way that's easy for people to consume and deploy," Howard says.

Power Your Planet

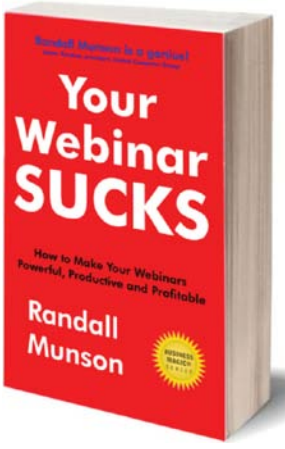
Howard says these POWER7 systems will have a tremendous impact on the industry in terms of price/performance levels and provide the expandability and capacity to enable customers to address new business challenges. "Our smarter planet initiative is about helping clients create new value in areas like healthcare, energy grids and crime prevention. Our POWER7 systems are designed for a smarter planet," Howard adds.

To Howard, the bottom line is pretty simple: "You get a whole lot more work done at a lot lower cost." P

Tami Deedrick is the managing editor of *IBM Systems Magazine — Power Systems edition.*

Send feedback to Managing Editor Tami Deedrick at tdeedrick@msptechmedia.com.

Best Selling Author
Randall Munson



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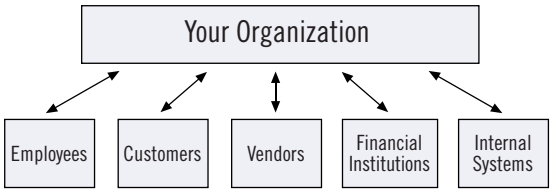

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Five business problems solved by Power Systems server consolidation

By Ken Milberg

TAKEAWAY

- Stop dedicating host machines with virtualization and increase server utilization and sharing.
- Shrink software costs dramatically with fewer but more-powerful cores.
- Reduce footprint and energy requirements with EnergyScale, Rear Door Heat eXchanger and more.
- Find more capacity on demand for unpredictable, short workload spikes.
- Migrate commodity Lx86 servers to Power Systems partitions without recompiling.

Perhaps no other project today is as popular as server consolidation. Properly implemented, it can help increase manageability, availability, scalability and performance while reducing total cost of ownership (TCO). Server consolidation can eliminate extra, disparate servers, excessive licensing and maintenance costs, and the headache of managing huge, inflexible physical server farms. But the primary reason consolidation projects get approved is cost. These days, all approved projects must offer significant ROI, and server consolidation can provide attractive ROI and TCO.

ILLUSTRATION BY STUART BRADFORD

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Does the Competition Stack Up?

HP is running a large marketing campaign around its midrange virtualization. HP's Integrity Virtual Machines (IVM) may be a move in the right direction, but they have many limitations and can run on few supported systems. It's important to note that HP PA RISC servers aren't supported. IBM's PowerVM* runs on the entire IBM Power Systems* line from blades to the mighty Power* 595 and supports partitions from one-tenth of a CPU to the entire system.

Further, HP's IVMs are limited to four logical processors per partition and 64 GB of RAM. Reboots are required to add processors or memory, and features such as uncapped partitions and shared processor pools are unsupported. You can't move virtual storage adapters unless the virtual machines are shut down, nor dedicate processing resources to single partitions.

—K.M.

A second motivation has been the recent, dramatic improvement and adoption of virtualization, without which server consolidation isn't a hot trend. Innovations in virtualization have made consolidation a viable business solution. It's worth noting that, while VMware has been getting much of the virtualization attention in recent years, IBM wrote the book on it and has a 40-year-plus history with virtualization.

Let's examine five business problems server consolidation addresses and see what makes it, and IBM Power Systems* servers specifically, so popular.

1. Server Farm With Low Utilization

The problem: You have a large, underutilized server farm. Your IT staff reports anywhere from 10- to 20-percent maximum utilization on most of your servers. You've determined that this inefficiency costs millions of dollars yearly. Still, your IT staff can't deploy new environments as quickly as departments need them. You need new environments created in the same day—sometimes within hours.

The solution: Server consolidation with appropriate virtualization can help maximize your hardware, which no longer must be a dedicated host machine. Multiple-host machines can share CPUs and RAM, dramatically increasing utilization. You can also maximize how operating systems are configured for application workloads and deploy environments rapidly, expanding IT's ability to support business.

Why Power? IBM's PowerVM* solutions provide the virtualization capabilities to grow utilization. With Virtual I/O Servers (VIOS), Micro-Partitioning* technology and workload partitions (WPARs), IBM Power Systems servers offer unparalleled levels of virtualization and utilization.

VIOS provides the sharing of I/O for AIX* and Linux* partitions. Hosting portions provide I/O services to clients that use these servers and let multiple VIOS client partitions share physical adapters. This helps reduce cost by making dedicated network and/or I/O adapters unnecessary. IBM's implementation uses Shared Ethernet and Virtual SCSI to allow network and disk I/O sharing.

Micro-Partitioning and shared-processor LPARs (SLPARs) let clients slice their CPUs into virtual partitions, with granularity down to one-tenth of a CPU. Virtual servers can run on any of the physical servers, as the physical processors are fully shared. You can exceed the number of CPUs—and the entitled capacity you configured while creating their profiles—using a feature called uncapped partitions. This feature enhances workload management by letting systems use idle CPU resources (from other LPARs that share a processor pool) during bursty, CPU-intensive cycles.

It's worth noting that while both HP and Sun offer some kind of virtualization around CPUs, neither offers anything like AMS. See "Does the Competition Stack Up?" (above) for more.

2. Exorbitant Software Licensing Costs

The problem: Skyrocketing licensing costs are devouring your budget. You're looking to get the most for your money.

The solution: Most software licensing today is by core. Consolidating into fewer physical boxes reduces cores, shrinking software costs. I've justified whole consolidation projects through database licensing savings alone, especially in Oracle* environments.

Why Power? When you compare UNIX* servers (www.ibm.com/systems/migratetoibm/systems/power/performance.html), Power Systems servers let you consolidate onto fewer cores than on any other vendor. And they offer superior CPU performance and the fastest processors in the industry so you get the most bang for your buck. Because of raw horsepower alone, IBM lets you consolidate to fewer cores than HP or Sun. For example, the 64-core IBM

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July 26-30	IBM System x Technical University	Washington, DC
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Power* 595 outperforms the 128-core HP Integrity Superdome with half the cores. The 595 also boasts 90 percent of the performance of the 256-core Sun SPARC Enterprise M9000—with a quarter of the cores. Software licenses only care only about the number of cores—not their performance.

3. High Energy Costs and Regulation

The problem: Electricity prices have mounted over the years. The more servers you add, the more power and cooling costs rise. Furthermore, your data-center footprint has been growing and it's running out. With energy-use regulations looming, you're considering going green for fiscal and compliance reasons as well as environmental.

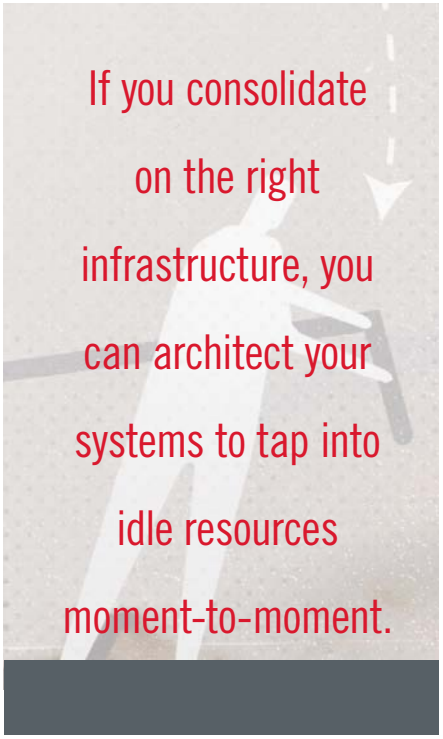
The solution: Fewer servers require fewer cooling devices, less power and a smaller footprint. You may even be able to consolidate data centers as part of your server-consolidation effort. The right server infrastructure adds cost-cutting efficiencies and furthers your mission to become more sustainable.

Why Power? With EnergyScale*, Rear Door Heat eXchanger and vertical-scaling technologies, Power Systems servers provide excellent energy-cost-to-footprint ratios. EnergyScale technology offers power trending, power saving and thermal measurement. These features, enabled via IBM Systems Director Active Energy Manager*, let you measure the system's energy use and direct policies toward energy-efficient operation.

Power Systems servers can also be placed in racks with a Rear Door Heat eXchanger, designed to remove heat generated from the back of your systems before it enters the room. This can substantially reduce the heat load coming from any IBM enterprise rack.

Inspired by mainframe technology, Power Systems servers let you scale vertically rather than horizontally. This lets you reduce the number of servers in your footprint.

Furthermore, Power Systems servers are more energy efficient than HP and Sun servers. Recent studies (www.ibm.com/systems/migratetoibm/systems/power/offerings.html) show that IBM's Power 595 uses less wattage than HP's Integrity Superdome or Sun's Enterprise M9000 series. Maximum energy requirements (watts) are also less on Power versus the other systems.


If you consolidate on the right infrastructure, you can architect your systems to tap into idle resources moment-to-moment.

4. Spikes in Demand

The problem: Your applications have become more demanding and need more raw horsepower. Analysis shows that your needs are bursty—applications can sometimes be very demanding and at other times create little server activity. You don't want to overspend on often-idle systems. You need scalability for immediate and future needs.

The solution: If you consolidate on the right infrastructure, you can architect your systems to tap into idle resources moment-to-moment and borrow capacity that's only needed during given periods.

Why Power? Through PowerVM, Power Systems servers let you tap into uncapped partitions through shared-processor pools. In other words, you can architect your systems to use more than the entitled capacity of your specific partition. A new PowerVM feature,

Server Consolidation Tools

IBM provides some tools to help you easily consolidate and implement virtualization on Power Systems* architecture.

Power on Wheels

www.ibm.com/developerworks/wikis/display/poweronwheels

This evolutionary addition to the Power Loaner Program is designed to help quickly determine if Power* technology is right for your server consolidation efforts by providing direct, hands-on access to the newest Power technology. Power on Wheels is a POWER6* processor in a Power 570 box, a Hardware Management Console and a Cisco network switch. It's meant to go to a customer site for two to three weeks to demonstrate the benefits of server consolidation and virtualization.

Alinean's IBM Systems Consolidation Evaluation Tool

www.ibm.com/systems/migratetoibm/whyibm/campaigns/jmp/hs22/roisavings.html

You can use this tool while assessing a server consolidation. It's designed to provide a preliminary, high-level analysis of the estimated cost savings by switching to IBM Power Systems servers from other platforms.

IBM System p Consolidation Guide

This tool, developed by the IBM PartnerWorld group IBM CompeteLine, consists of a complex spreadsheet with dynamic formulas used to help size Power Systems servers. It supports consolidation from systems including Sun, HP, Fujitsu and older pSeries* and RS/6000* server migrations.

Contact IBM or your local business partner for more details.

—K.M.

Multiple Shared Processor Pools, lets you balance processing power among partitions assigned to shared pools, resulting in better throughput. Shared Dedicated Capacity, another new feature, permits the donation of spare CPU cycles from dedicated processor partitions to be used in the shared processor pool. Neither HP nor Sun offers the capability to borrow resources from dedicated partitions. PowerVM's Utility Capacity on Demand (CoD) provides automated use of on-demand processors from the shared processor pool for short-term workloads on IBM POWER6* processor-based systems. Utility CoD is for customers with unpredictable, short workload spikes who need an automated, affordable way to help assure server performance is available as needed.

5. Disparate Systems in Need of Standardization

The problem: You have a heterogeneous, hard-to-manage server farm running disparate operating systems and you want to standardize on one hardware platform. Additionally, your Linux server farm consists of commodity-based Linux servers. You're trying to standardize on Linux, but worry that it breeds many of the problems that distributed systems caused years ago. With the trend toward data-center centralization and maximization, you're unsure what to do with Linux.

The solution: Server consolidation can let you standardize on platforms—hardware, operating systems or both.

Why Power? IBM Power Systems servers can run AIX, Linux and IBM i in partitions. Moving Linux to Power Systems servers offers the comfort of knowing your mission-critical applications are hosted on a powerful, reliable platform. IBM's PowerVM Lx86 further lets you migrate commodity x86 Linux servers to partitions on Power Systems servers without recompiling. HP and Sun lack this capability.

Solving Problems

Without question, IBM Power Systems servers can help you solve complex business problems through consolidation and virtualization. This best-of-breed platform can increase utilization, minimize user licenses, reduce energy use, meet demand peaks, and standardize hardware and operating systems. Perhaps now is the time to lower your TCO and increase your ROI with a strong Power Systems consolidation project.

Ken Milberg is an *IBM Systems Magazine – Power Systems edition* technical editor and the president and managing consultant of PowerTCO.

IBMSystems magazine WEBCAST

Why Service Enable your IBM i applications

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WHO SHOULD ATTEND

Anyone interested in maximizing their integration potential with the IBM i through Web Services.

WHEN

Tuesday, March 2, 2010 1pm EST
Wednesday, March 3, 2010 10am GMT

AGENDA

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Jeffrey Tan, Abbott Laboratories

*"**look**software has allowed us to save hundreds of hours of development time and more importantly, thousands of dollars of expensive consulting effort to port existing, time-tested iSeries functionality over to the Microsoft Dynamics AX platform. With **soa**rchitect, we can leave this already-working business logic intact on our System i and simply use web services to exchange data as needed with our new Dynamics AX system…"*

George Hamin, Director of eBusiness & Information Systems, Subaru.

FEATURING

Trevor Perry

Trevor Perry has been a consultant in the midrange industry for over 20 years and is an expert on IT strategy and modernization. He has been recognized by iSeries400 Experts as one of the Top 10 industry influencers, and is actively engaged in the IBM i community. Trevor is a popular speaker at industry conferences and user groups on many technical and keynote subjects, and forges new trails with his motivational sessions.

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ILLUSTRATION BY KEN EDMONDSON

Open a New Door for Your Business

Lotus and Zend boast active open-source communities

By Kim Greene

In a word, open source is collaboration. More specifically, it's public collaboration on a software project. Companies adopt open source to save money and to use, change and improve code. The high attendance at a COMMON annual conference session I presented on open source and Lotus* Domino* last year suggests open source has become a way of life.

Think of how many years IBM has committed to Java*, a cross-platform application environment available on every open platform today, and Linux*, an open-source operating system that any company can choose to run. IBM has committed to open source in a big way with contributions to more than 120 projects, including more than $1 billion in Linux development. It's also donated Eclipse to the open-source world.

Open source has become vital to my own business as well. I focus on Lotus Domino and PHP—two technologies with active open-source communities. Let me share some of the helpful communities I've discovered.

Opening Up Lotus

OpenNTF (www.openntf.org) has been in the Lotus Domino and Lotus Notes* communities for several years. The site is devoted to enabling groups of individuals worldwide to collaborate on Notes and Domino applications and release them as open source.

Before OpenNTF, IBM and business partners put code samples and sample applications in the Lotus Sandbox. IBM, along with others in the community who provided code snippets and sample applications on their Web sites and blogs, used this repository for years. Once OpenNTF began, the Sandbox community migrated in favor of OpenNTF's volume of contributors.

OpenNTF contains not only open-source software and code snippets that can be downloaded free, but also a forum and IdeaJam. IdeaJam lets OpenNTF participants post ideas and have them discussed and ranked. Through topic's comments and the level of promotion or demotion they receive, the community collaboratively determines what OpenNTF enhancements are top priority. IdeaJam is itself an open-source contribution to OpenNTF.

Last June, IBM joined forces with OpenNTF to create the OpenNTF Alliance. This alliance was formed to establish that IBM fully supports the open-source community and will invigorate it by donating code samples, templates and applications for download on the OpenNTF Web site. To read more, visit the IBM developerWorks* OpenNTF Alliance Web page (www.ibm.com/developerworks/lotus/library/notes-openntf).

Read More

IBM developerWorks Open Source
www.ibm.com/developerworks/opensource

Open source: IBM's deadly weapon
http://news.zdnet.com/2100-10532_22-296366.html

I'm amazed at how **ways of doing business** have changed due to **use of and contribution to** open source.

Wide-Open PHP

Now that my company has expanded into PHP, I'm amazed at how substantial the open-source contributions are to the PHP community. An open-source scripting language designed for Web-application development, PHP enables simple scripting. It's popular for content management, customer-relationship management, database access, e-commerce, forums, blogs, wikis and other Web-based applications. It can be deployed on most Web servers and on almost every operating system and platform free of charge.

Zend Technologies (www.zend.com), a PHP provider and significant open-source contributor, has four open-source projects and community products:

- Zend Framework
- PHP/Zend Engine
- Eclipse PDT Project
- Zend Server Community Edition

Zend believes that contributing to the open-source community is important and has vowed to devote significant company resources to sponsoring and leading the Zend Framework project, which has more than 300 contributors.

During the opening session of ZendCon 2009, Zend CEO Andi Gutmans, explained how incorporating open-source Mylyn helped the company provide task-focused capabilities in Zend Studio 7.1. Mylyn helps developers work more efficiently by letting them focus the Eclipse user interface on relevant task information. Mylyn is built to minimize developers' navigation, searching and scrolling.

I'm amazed at how ways of doing business have changed in the past few years due to the use of and contribution to open source. One customer who spoke during the opening session of ZendCon 2009 was Petra Ruehl, VP of product development at Deutsche Telekom, who said the company found its business model changing through PHP. Because PHP has so many open-source contributors, Deutsche Telekom realized the significant market advantage it could gain by using PHP open source in its newer products.

Open Source Scripts (www.opensourcescripts.com/dir/PHP) and PHP Open (http://phpopen.net) are two excellent PHP resources. PHP Open provides demonstrations of PHP open-source software so users can find, compare and test it. PHP Open is special in that it lets users try an application from both an end user and administration perspective before investing the time of downloading, installing and configuring it. The site has a ranking system and offers MySQL open-source software.

The New Reality

Open source shaping how companies do business. For example, anyone wanting to administer MySQL can use the phpMyAdmin (www.phpmyadmin.net) open-source GUI to access it from any platform. If you're using Lotus Domino or PHP, I encourage you to check out these resources and see how open source can open doors for your business.

Kim Greene is an *IBM Systems Magazine — Power Systems edition* technical editor and the owner of Kim Greene Consulting Inc., specializing in Domino for i and PHP consulting.

Send feedback to Managing Editor Tami Deedrick at tdeedrick@msptechmedia.com.

ILLUSTRATION BY KEN EDMONDSON

Space Heaters

How the Swiss Federal Institute of Technology uses data-center heat to cut energy costs

By Jim Utsler

Data centers, while essential, can be rife with challenges. Data-center system performance is soaring, but it comes with a trade-off: It now takes more energy to cool those hot-running boxes and their increasing number of processors. Coupled with growing utility costs, this can impact organizations' bottom lines. Energy costs now approach, if not equal, system costs.

IBM Research is tackling these issues head-on, exploring the possibilities of harvesting—at the chip level—the energy produced in data centers to, for example, heat other buildings. Such is the case at the Swiss Federal Institute of Technology (ETH) in Zurich and the IBM-developed Aquasar system. This hybrid system will soon be used for critical scientific research and as a way to suppress the research facility's heating costs.

Bruno Michel, manager, Advanced Thermal Packaging, with IBM Research–Zurich, explains how Aquasar uses water

to collect the heat dissipated from chips, then ties that into the ETH's campus heating system. He even foresees a day when such systems will become commercially available to not only reduce energy use, but also let IBM customers add a revenue stream by selling excess energy to other organizations.

Q. How was Aquasar developed? Was it a direct collaboration between IBM Research and ETH?
A. We developed the basic technology here at IBM Research–Zurich, and now we have a contract and collaborative arrangement with ETH to develop the zero-emission technology on their system.

This is part of the First-of-a-Kind (FOAK) project, which brings together IBM researchers and clients to test new technologies on real business problems and growth opportunities. Our project with ETH is to take an existing IBM commercial system and convert it to water-cooling at the system—or data-center—level. At this point, most of the equipment has been shipped to ETH, and the deployment will be completed in April.

Q. Does the system include IBM BladeCenter* technology?
A. Yes. We looked at existing computer technologies and hybrid architectures such as those used in IBM's Roadrunner supercomputing environment. So our two BladeCenter solutions are comprised of QS22 IBM PowerXCell* 8i processors and HS22 blades with Intel* Nehalem processors.

BladeCenter technology already has a high efficiency and a very dense form factor, which makes it a great starting point for improving power-usage efficiencies, but we wanted to make it even more efficient—beyond just the hardware level to encompass the system level. We now have a system that has the best performance within a desired metric, which we call "megaflops per grams CO2 emitted."

IBM's First-of-a-Kind Program:
www.research.ibm.com/foak

Q. How will the ETH system be used?
A. The Computational Science and Engineering Lab of the Computer Science Department of ETH Zurich will use it for flow simulations related to issues encountered at the nanotechnology-fluid dynamics interface. The system has excellent performance, running at about 11 teraflops. It's not a very big system, but users will still be able to do some very interesting modeling on this.

Q. How long has IBM been researching using water to cool systems?
A. The thermal-packaging project started six years ago, and we started the development of the zero-emission data-center concept three years ago. That coincided with one of the first reports to explain the economic consequences of climate change and

Power Systems Interface

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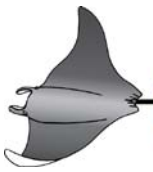

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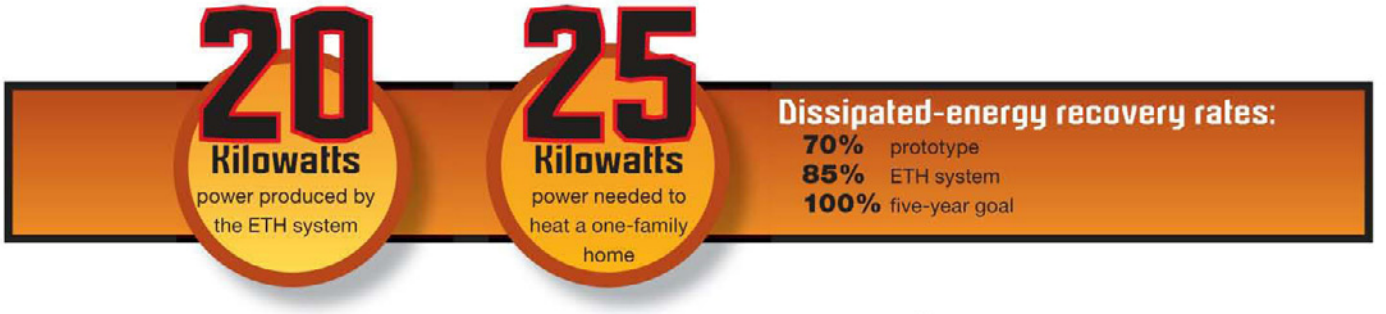

reduce carbon-dioxide emissions, we can actually stimulate our economy and help tackle climate-change issues.

Q. Can you explain exactly how the system works, especially pertaining to water-cooling at the chip level?

A. The level of thermal energy is higher when you capture it as close to the source as possible, which, in a computer, is the transistor. If you capture thermal energy in an air-cooled data center, you're very far away from the transistor, which means the level of energy being captured is dramatically reduced and may ultimately be wasted.

In the case of Aquasar, the chip-level thermal energy is transported from the transistor to the fluid—and then transferred out of the data center with a heat pump. We can now get rid of the heat without additional cost and use it for ancillary heating purposes in cold climates and, in hot climates, to run absorption heat pumps.

Q. Is it paying for itself in some ways?

A. Well, we think that when we run a data center in a very cold climate, we could sell heat for much of the year and reduce our data-center energy costs by a factor of three. And if you're driving the data center with energy from a geothermal or other power source and not a coal-fired electrical plant, we effectively have a negative emission. In the future, with large get money back by selling emission allowances, which would reduce our energy cost to almost zero.

Q. Has this been tested to determine what types of cost and energy savings would result?

A. We've tested it as a smaller prototype in the IBM Zurich Research Lab and measured all the energy consumption and the energy recovery. A very good prototype has a 70-percent recovery rate and the ETH system will have an 85-percent recovery rate. What I mean by this is that 85 percent of the dissipated energy is collected in the form of hot water and 15 percent is traditionally collected by air cooling. Our goal is to have 100-percent liquid-cooled system within five years.

Q. Isn't even 85 percent pretty good when compared with a traditional data center?

A. Yes. Those data centers collect energy at very low temperatures. We're collecting thermal energy at high temperatures, which makes it a resource. Here in Switzerland, in a cold climate, we use about 30 percent of our carbon footprint on space heating. We can use the energy from systems such as Aquasar to do space heating without any further modifications. All we have to do is transport the heat from the data center to district-heating or neighborhood-heating systems, which in the Aquasar project with ETH is to warm in the winter.

Q. How much space can you heat with this system?

A. Our system produces about 20 kilowatts overall. As a rule, you can heat one building—or a one-family house—with 25 kilowatts. If you have a well-insulated house—like the new minimal-energy houses in Switzerland that consume only 7 kilowatts—you can maybe heat two or three of them. ETH owns about 60 buildings in Zurich, and it has connected the majority to a neighborhood-heating system that we're going to feed into. Although we won't be providing the heat for all of those buildings, we'll be helping them cut down on some of their energy costs.

Q. Isn't this far from the way data-center heating and cooling issues are currently addressed?

A. For sure, yes. In fact, I wonder how much longer we can continue running data centers as we do today. Typically, 30 percent of data-center energy goes into the boxes and then another 30 percent is used to help us throw away the energy that we feed into the boxes. This is absolute nonsense. Just 10 years ago, data-center energy bills were 2 to 3 percent of the hardware cost. Now that energy bill is the same as the cost of hardware.

Q. To what do you attribute that?

A. Our demand for computation in data centers has increased 30 percent per year

> **"We can now get rid of the heat without additional cost and use it for ancillary heating purposes in cold climates and, in hot climates, to run absorption heat pumps."**
>
> **—Bruno Michel, manager, Advanced Thermal Packaging, IBM Research–Zurich**

over the last 10 years. Over that same time period, we were able to increase the efficiency of our system by 15 percent per year. That wasn't enough. We have an increased demand for energy.

It's been documented that in several data centers energy consumption has doubled in the last four years on average. At the same time, the energy cost for electrical energy in most locations also doubled. That means we have in four years a four-times higher energy cost. If we don't change things, we'll have a further doubling of energy consumption four years from now. And you can't assume that energy prices will become lower.

IBM itself is spending $500 million on energy, approximately half of it in data centers. Now, by using more energy-conscious data centers, we can reduce energy consumption by 40 percent. That's roughly $100 million, and we could then sell the heat that comes out of all those IBM data centers and gain even more monetary savings and further cut down on CO2 emissions.

Q. IBM has recognized the impact of climate change. Does the company have the lead on this?

A. We're leading in research, but we now have to convert that into a product. Of course, we can't make an impact on the planet by having just one rack system. We need tens of thousands of racks to be converted. The good thing about the ETH hybrid approach is that we have the convergence of two different blades, one of which is more for high-performance computing and the other of which is a standard high-volume retail blade that can, without any changes, be used for commercial computing as well. Eventually, System z* and Power Systems* servers could adopt this approach for commercial use as well.

Q. What's the ultimate goal of the research behind the Aquasar environment?

A. It's in some ways business driven. We want to be able to tell potential customers, "Here's how much money you can save and, oh, by the way, you can heat your buildings during the winter and perhaps sell whatever overage there is."

Additionally, a lot of countries now have committed to very challenging targets to reduce CO2 omissions and, to reach those targets, each industrial branch has to contribute a lot. This includes the IT industry, which also has to contribute to the reduction of CO2 emissions. We can now claim to be on the good side of that.

Send feedback to Managing Editor Tami Deedrick at tdeedrick@msptechmedia.com.

Jim Utsler, *IBM Systems Magazine* senior writer, has been covering technology for more than a decade.

IBMSystems magazine

WEBINAR

Presented by GSS Group Inc.

Data Warehousing – Turn "No Can Do" into "Yes, I Can"

Learn how to do data warehousing Faster, Easier, Better...and Cheaper!

WHO: IT Managers, Corporate Managers and Individuals interested in leveraging and exploiting data on IBM i, IBM p, or other platforms

WHEN: Tuesday, March 9, 2010 at 2 PM EST

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Availability ROI Tool and iSCORE

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iSCORE

→ iSCORE Performs health checks on IBM i systems by analyzing multiple system attributes.
→ The tool generates a portfolio of graphical reports, including a numeric summary score of the system's state of optimization.
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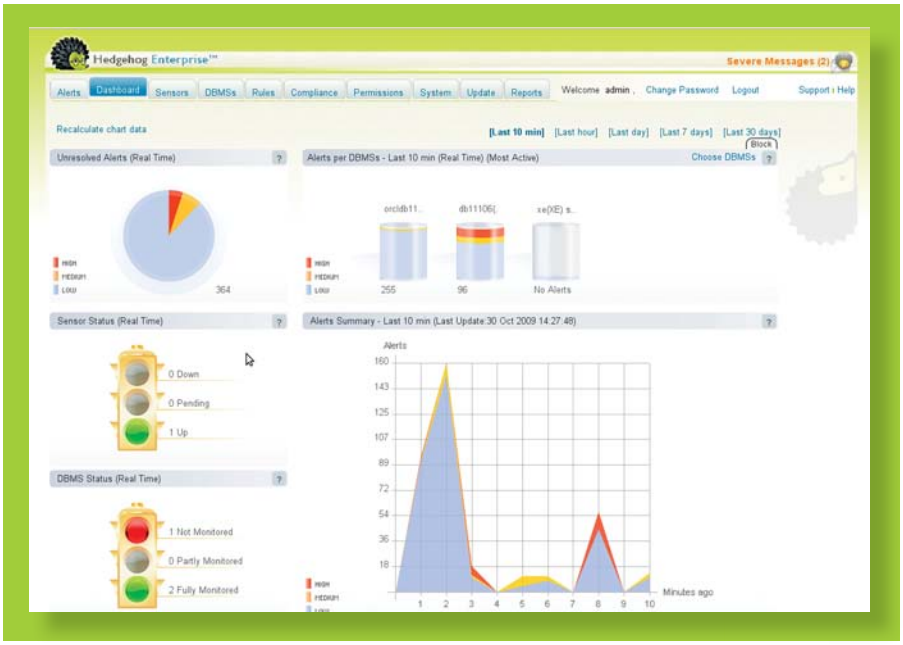
OS SUPPORT: ART: IBM i, AIX*; iScore: IBM i 6.1 and 5.4
PRICE: Free
URL: www.visionsolutions.com



Hedgehog Enterprise 3.5

Sentrigo

Sentrigo releases Hedgehog Enterprise 3.5, a database activity-monitoring and intrusion-prevention solution. Several enhancements include:

→ A new Application Mapping feature that collects information on databases, applications and users, and provides administrators with a simple interface to turn these findings into rules
→ Automatic identification of statistical data to build customized, granular security policies quickly, typically in just weeks
→ Improved support for efficient WAN deployments by compressing traffic between remote sensors and the server, enabling central management and monitoring of geographically distributed systems
→ A community feedback mechanism to gather data on virtual patch alerts and automatically share this with Sentrigo's research team, leveraging the experience base of all users to track database attack trends
→ Improved reporting and standards compliance templates

OS SUPPORT: AIX* 5.1 and above; Linux*
PRICE: Starting at $1,400 per core
URL: www.sentrigo.com

PER/ZIP4

WorksRight Software Inc.

WorksRight Software's PER/ZIP4, which matches addresses to the national ZIP+4 postal database, has been recertified for Coding Accuracy Support System (CASS) processing by the U.S. Postal Service (USPS) for the 2009-10 cycle. PER/ZIP4 works within CASS to help businesses qualify for USPS postage discounts. It features:

→ A batch interface for processing complete files
→ An interactive interface for processing individual addresses
→ An API interface for incorporating address standardization and validation into existing applications
→ Sample code demonstrating the printing of POSTNET and Intelligent Mail bar codes
→ A free 30-day trial

OS SUPPORT: IBM i 6.1 and 5.4, i5/OS* V5R3, OS/400* V5R2-V4R2
PRICE: $4,800 per system for the first year; $2,400 subsequent renewals
URL: www.worksright.com

Object Distribution Facility

Easy400

The open-source Easy400 site releases Object Distribution Facility (ODF) to let you distribute and install objects to a user-defined group of IBM i* servers via FTP. ODF highlights include:

→ One distribution command for up to 50 target systems
→ The capability to remotely run up to 21 commands
→ Automatic object saving and restoring
→ Support for target systems with different operating-system releases

OS SUPPORT: IBM i 6.1 and 5.4, i5/OS* V5R3, OS/400* V5R2
PRICE: Free
URL: www.easy400.net/odf/html/page1.htm

Dual Monitor Utility

10ZiG

Dual Monitor Utility enhances multidisplay environments on 10ZiG Thin Clients. Highlights include capabilities to:

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OS SUPPORT: Platform independent
PRICE: $30 suggested retail
URL: www.10zig.com

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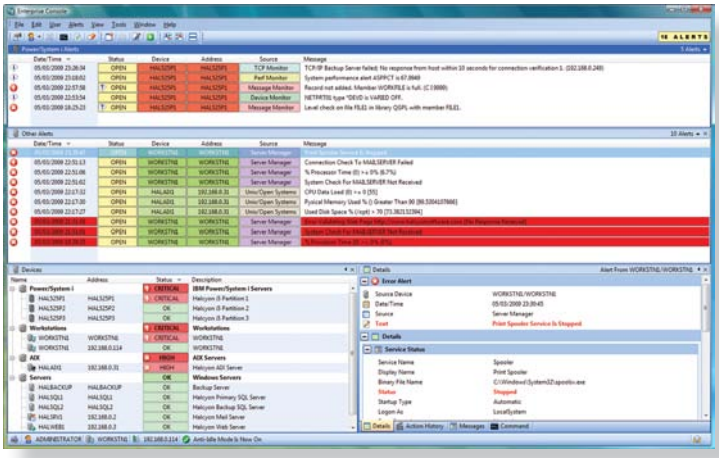
- Most cost-effective conference option for your 2010 educational needs.
- Largest gathering of the Power Systems user community.
- Once-in-a-lifetime opportunity to be part of this organization's momentous 50-year milestone.
- The largest Exposition of its kind with over 80 vendors present to supple ment your education.
- Extraordinary networking opportunities - have fun, learn and share with your peers, renowned speakers, IBM developers, executives, and fellow members.

The Annual Meeting will kickoff on Monday, May 3, 2010 with the Opening Session, which will include a special message to the attendees from Sam Palmisano, IBM's Chairman of the Board, President and Chief Executive Officer! The Opening Session will also feature a keynote address by Rod Adkins, Senior Vice President, IBM Systems and Technology Group.

The COMMON 2010 Annual Meeting and Exposition is the premier educational and networking event that you and your team will not want to miss. Learn more and register today at www.common.org/annualmeeting!

Orlando is also a great family destination, so consider making a vacation out of it while attending the 2010 Annual Meeting and Exposition. The Hilton Orlando is offering a special to attendees where if you stay 6 nights, the 7th night is free. There are also special discounts to Disney and other parks available to COMMON attendees. Don't miss out on these exciting opportunities to enhance your time in Orlando!

www.common.org/annualmeeting



Systems Operations Suite 3.0

Halcyon Software

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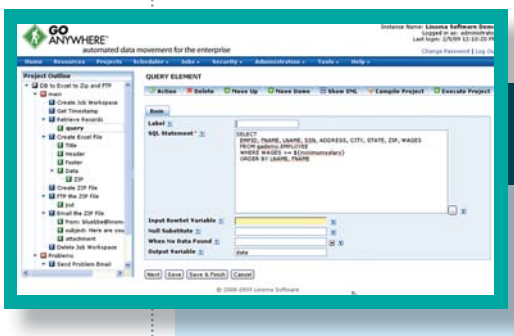
OS SUPPORT: IBM i 6.1 and 5.4, i5/OS* V5R3
PRICE: Starting at $5,000 purchased or $229 per month rental contract
URL: www.halcyonsoftware.com



GoAnywhere

Linoma Software

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→ Validation on AIX and Linux on System p* platforms and for Linux on System z* platforms
→ The capability to connect to database and file systems on IBM and other servers to retrieve, transform, encrypt, compress and distribute data through a managed environment
→ The capability to exchange data using many standard protocols, including FTP, SFTP (SSH), FTPS (SSL or TLS), HTTP/s, JDBC, Open PGP and SMTP
→ A free fully functional trial

OS SUPPORT: IBM i, AIX, Linux, Windows
PRICE: Starting at $3,995
URL: www.goanywheremft.com

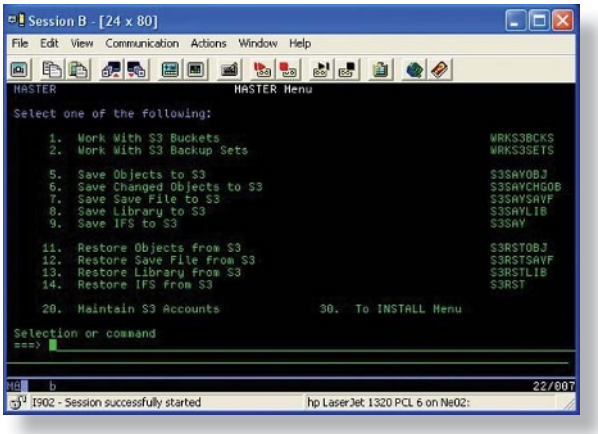
i2S3

Kisco Information Systems

Kisco releases i2S3, a new cloud-based save and restore utility for IBM i. Details include:

→ An interface with Amazon's Simple Storage Service (S3), a low-cost file storage service that can be used for any kind of file storage but is well suited for backup file storage
→ A set of commands that mimic the IBM i save and restore commands
→ Creation of a detail list of objects included in the backup set for each save operation run from i2S3
→ No need for media mounts or other operator intervention
→ Encryption for backups
→ Support for the traditional library file system and IFS
→ Amazon S3's size limitation of 7 GB for individual backup sets stored, sufficient for single library save and restore or single folder/path save and restore operations

OS SUPPORT: IBM i 6.1 and 5.4, i5/OS* V5R3, OS/400* V5R2 and V5R1
PRICE: $1,295 single; $2,195 LPAR
URL: www.kisco.com/i2s3


Session B - [24 x 80]
File Edit View Communication Actions Window Help
MASTER
HASTER Menu
Select one of the following:
1. Work With S3 Buckets
2. Work With S3 Backup Sets
5. Save Objects to S3
6. Save Changed Objects to S3
7. Save Save File to S3
8. Save Library to S3
9. Save IFS to S3
11. Restore Objects from S3
12. Restore Save File from S3
13. Restore Library from S3
14. Restore IFS from S3
20. Maintain S3 Accounts
30. To INSTALL Menu
Selection or command
===>
MA b
22/007
I902 - Session successfully started
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Feedback received from the SHARE in Denver conference evaluation, August 2009.

Register at seattle.share.org/2010

Wisely Using Performance Benchmarks

Systems performance benchmarking can be wonderful for evaluating performance and comparing servers and storage. Numerous industry-standard benchmarks are ripe for the picking across application portfolios. If you can use existing, publicly available results from these benchmarks to help you in your analysis, the data is freely available.

How can you decide which benchmarks to select and what to emphasize in your systems analysis? There are so many industry-standard and ISV tools to choose from: benchmarks from the Transaction Processing Performance Council that evaluate online transaction processing and business intelligence (BI) applications; Standard Performance Evaluation Corporation benchmarks that focus on the Web, Java* applications and even energy efficiency; virtualization benchmarks; ISV benchmarks from SAP that include sales and distribution, BI, and banking; storage benchmarks from the Storage Performance Council; specialized application benchmarks that are perfect for high-performance computing applications—everything from computational fluid dynamics to the weather; and many more.

The most crucial input in your decision of which benchmarks to use is a deep understanding of the business and the application. You must choose a benchmark that maps well to your specific application. Sometimes a single benchmark works well. You may also want to use a combination of results on different benchmarks. Other times, nothing seems to fit and you may need to run your application in a special controlled-benchmark environment at your site or a vendor's location.

The most important aspect in comparing systems performance using industry-standard and ISV benchmarks is understanding the configurations you're comparing. Is one system clustered with hundreds of cores and the other a large, single, nonclustered system? Are they similar in size—do they have the same or a similar number of processor chips, cores and threads? How different are the operating and database systems? It may not make sense to compare a Linux* system running DB2* with a Windows* system running SQL Server. One benchmark result may employ a sophisticated database for use with complex BI solutions, while another might use a very simple database. What about network protocols, or sizes of databases and load times? You probably don't want to compare a BI workload of 100 GB with one of 100 TB. Examine what storage is used; some of the latest benchmark submissions employ solid-state drives, which—though great technology—don't directly compare to other storage technologies. These are just some of the many differences in configurations used in benchmarks that may affect the end result. Be certain you're comparing like systems. And when you're not, your modeling must account for these differences.

It's also imperative to understand the benchmark consortia rules. For instance, are you allowed to derive other metrics from the benchmark's metrics? Are you allowed to compare one database size with another, or an older version of a benchmark with a newer version? Price/performance may or may not be a component of the benchmark that can be analyzed publicly.

The ultimate goal in using systems-performance benchmark results for evaluating performance is ensuring an apples-to-apples comparison. You need to understand when one result is a Cortland and one is a McIntosh, or if you're comparing a peach and a nectarine. (Peaches are fuzzy.) With these types of differences, the benchmark results can still be employed as an extremely valuable systems tool, as long as you take into account the differences in your modeling and comparison efforts. Most of all, make sure you're not directly and absolutely comparing apples to pineapples, where about the only thing in common is six letters.

"The most crucial input in your decision of which benchmarks to use is a deep understanding of the business and the application."
—Elisabeth Stahl,

Elisabeth Stahl
Chief Technical Strategist
Performance Marketing
Executive IT Specialist
IBM Systems and Technology Group

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Snapshot

Meet your peers

Name: Ryan Johns
Title: Network engineer
Years in IT: Nine
Company name: Skagit County, Wash., Government
Company function: Government duties including public safety

What's the biggest challenge your data center faces today? Our biggest challenge today is maintaining current service levels with a rapidly shrinking budget. It's a big challenge, but it's also an opportunity to become more innovative and efficient.

What will be the next big thing for your business? Doing more with less.

What business skill would you most like to acquire or improve? I am always looking to improve my UNIX* and Perl skills.

What's your favorite IBM product and why? I am a big UNIX fan, so it would have to be AIX*. It's a super-solid platform.

How did you end up in IT? I was working in the public-safety field and became very interested in the computer system all of the law-enforcement agencies in Skagit County use. When a job opportunity presented itself to manage this system, I jumped on it. That career change was one of the best decisions of my life.

If you weren't in IT, what job would you want? I don't know if there's anything I would rather be doing. I really enjoy my job and the people I work with.

What's your favorite activity outside of work? Spending time with my wife and four children.

What's the geekiest thing you've ever done or owned? I never really considered myself much of a geek until I started working in IT. I suppose that means working in IT is probably the geekiest thing I've ever done.

What superpower do you wish you had? Ability to manipulate time.

My guilty pleasure is ... Coca-Cola and Krispy Kreme doughnuts.

If money were no object, what's the one thing you would purchase? I've always wanted a Black Hawk helicopter.

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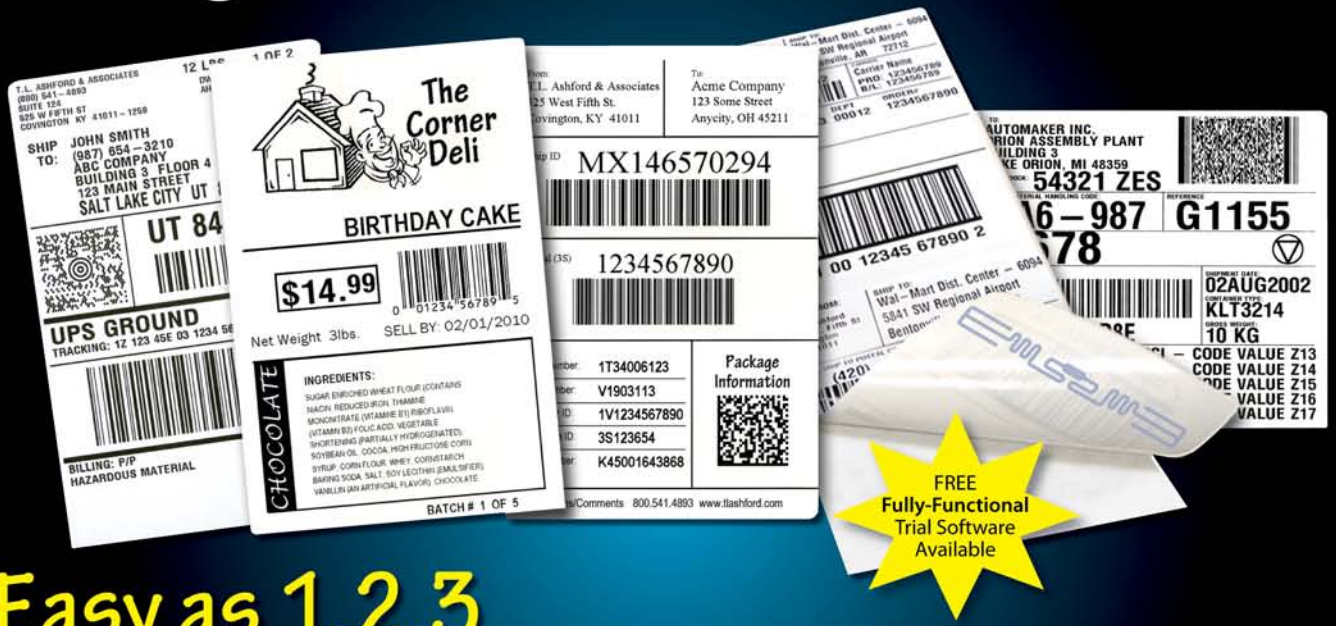

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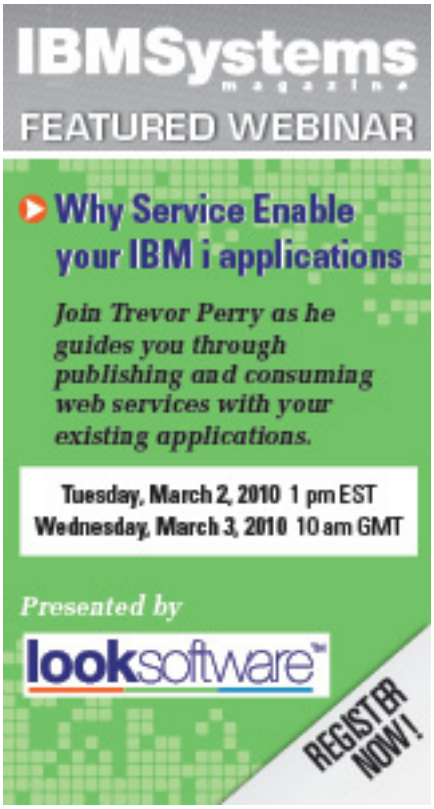
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